Southeast Springfield Development Study

City Council

Mayor Tom Carlson
Denny Whayne
Shelia O. Wright
Ralph Manley
John D. Wylie
Mary Collette
Gary Gibson
Teri Hacker
Bob Chancellor

City Planning Commission

Patrick Platter
Chuck Foster
Johnny R. Faulkner
Warren Dean Graham
Bobbi Ream
Larry D. Folkins
George Chapman
Jerry Compton
Susan Hansen

City Staff

Fred May	Director of Planning and Development
Ann Razer	Principal Planner
Bob Hosmer	Senior Planner

Consultants

William Weber, AICP	Project Manager
Miles Lindberg, RLA	Project Designer
Dan Meyers, AICP	Transprotation Planner
Gina Buss, PE	Transportation Planner
Etoile Strachota	Geographic Infomration System
Yang Vang	Geographic Information System
Carol Nagan	Graphics

840 Boonville Avenue 65802
(417) 864-1000

CITY of SPRINGFIELD

Southeast Springfield Development Study

List of Figures

List of Tables

Southeast Springfield Development Study

Introduction

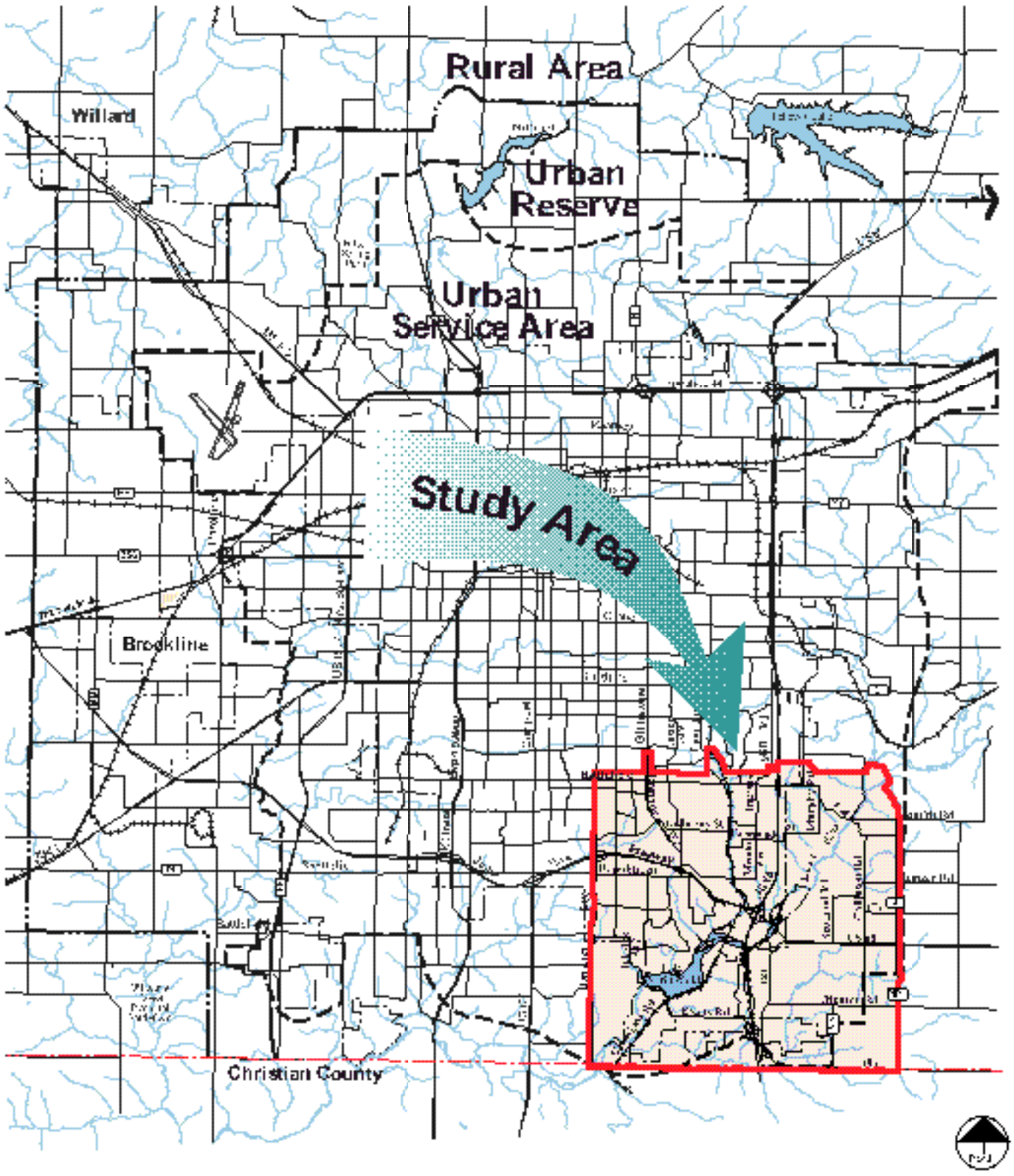
The purpose of the Southeast Springfield Development Study is to examine potential development patterns and infrastructure needs for key undeveloped properties or potential development properties in the Study Area. The overall objective is to help the City determine the optimal combination of pubic investments in roads and utilities so that the goals of the *Vision 20/20* comprehensive plan can be realized.

This study includes these tasks:

- **Alternatives:** Propose and rank various alternative land uses and infrastructure needs.
- **Evaluation:** Select a preferred alternative based on a cost-benefit analysis associated with public and private infrastructure investments and economic return while considering impacts on the environment and existing development.
- **Policies:** Make policy recommendations to meet the needs of the preferred alternative.
- **Design Guidelines:** Develop design guidelines for development in the study area.
- **Implementation:** Create a document that can be used by the City to guide private developers in drawing site plans or plats, to review those site plans or plats and to make public infrastructure decisions.

Study Area Location

The boundaries of the Southeast Springfield Development Study Area are defined as just north of Battlefield Road on the north, the Greene and Christian County border on the south, National Avenue on the west and State Route J on the east. (Refer to Figure 1.) The James River runs across the Study Area diagonally, flowing southwesterly.



CITY of SPRINGFIELD

Southeast Springfield Development Study

Figure 1

Study Area Location

0 1/4 1/2 3/4 1 Mile

North

10 AC
40 AC

CITY of SPRINGFIELD

Southeast Springfield Development Study

Figure 2

Aerial Photograph of the Study Area

Analysis of Conditions

This section describes and draws conclusions from several aspects of the natural and man-made environment in the Study Area.

The elements of this section are:

1. Land Parcelization
2. Pattern of land use
3. Zoning
4. Planned land use from *Vision 20/20*
5. Road system
6. Public sewer and water systems
7. Streams, lakes and floodplains
8. Slopes and sinkholes
9. Summary of site forces

Land Parcelization

The patterns of land parcelization and public roads are depicted by Figure 2. Most of the land northwest of the James River has been platted into urban-sized lots, usually about _ acre to 1/3 in size. A large part of the Study Area, which is mostly in Greene County, is generally divided into larger parcels in the range of 3 to ten acres in size or larger.

These semi-rural lots are very difficult to resubdivide into urban-scale parcels and serve with public sewer and water lines. The practice of platting five- and ten-acre lots all around the perimeter of Springfield is costly to the whole community as it greatly increases the cost of roads, sewer lines, water lines, driving time, school busing, park system development and other facilities or services. Cost-effective urban development is greatly hindered by this pattern and the visual beauty of the rural countryside is lost. Fortunately, there are a few locations in the Study Area that have not yet been divided in that fashion.

parcels.mxd

LEGEND:

- Parcels
- Street Centerline
- County Boundary
- City Limits
- Minor Stream
- Major Stream

0 1/4 1/2 3/4 1 Mile

North

10 AC
40 AC

CITY of SPRINGFIELD

Southeast Springfield Development Study

Figure 3

Land Parcelization, 2001

Current Pattern of Land Use

The generalized pattern of current land use in the Study Area illustrated by Figure 4 reveals that approximately 40 percent of the Study area is urbanized, approximately one-third is open and amenable to development and the rest is partially developed with houses on large, semi-rural lots (3 to 10 acres). Very few of those semi-rural lots are likely to be resubdivided in the foreseeable future.

A railroad line runs along Lone Pine Road to serve the City Utilities coal-fired electric power plant located just down river from Lake Springfield. The rail line has an at-grade crossing of the James River Freeway with traffic signals on the highway, an unusual and hazardous feature for a limited access highway.

Parks include Sequiota (along Galloway Creek), the Springfield Conservation Nature Center (adjacent to Lake Springfield on the James River) and Living Memorial Park.

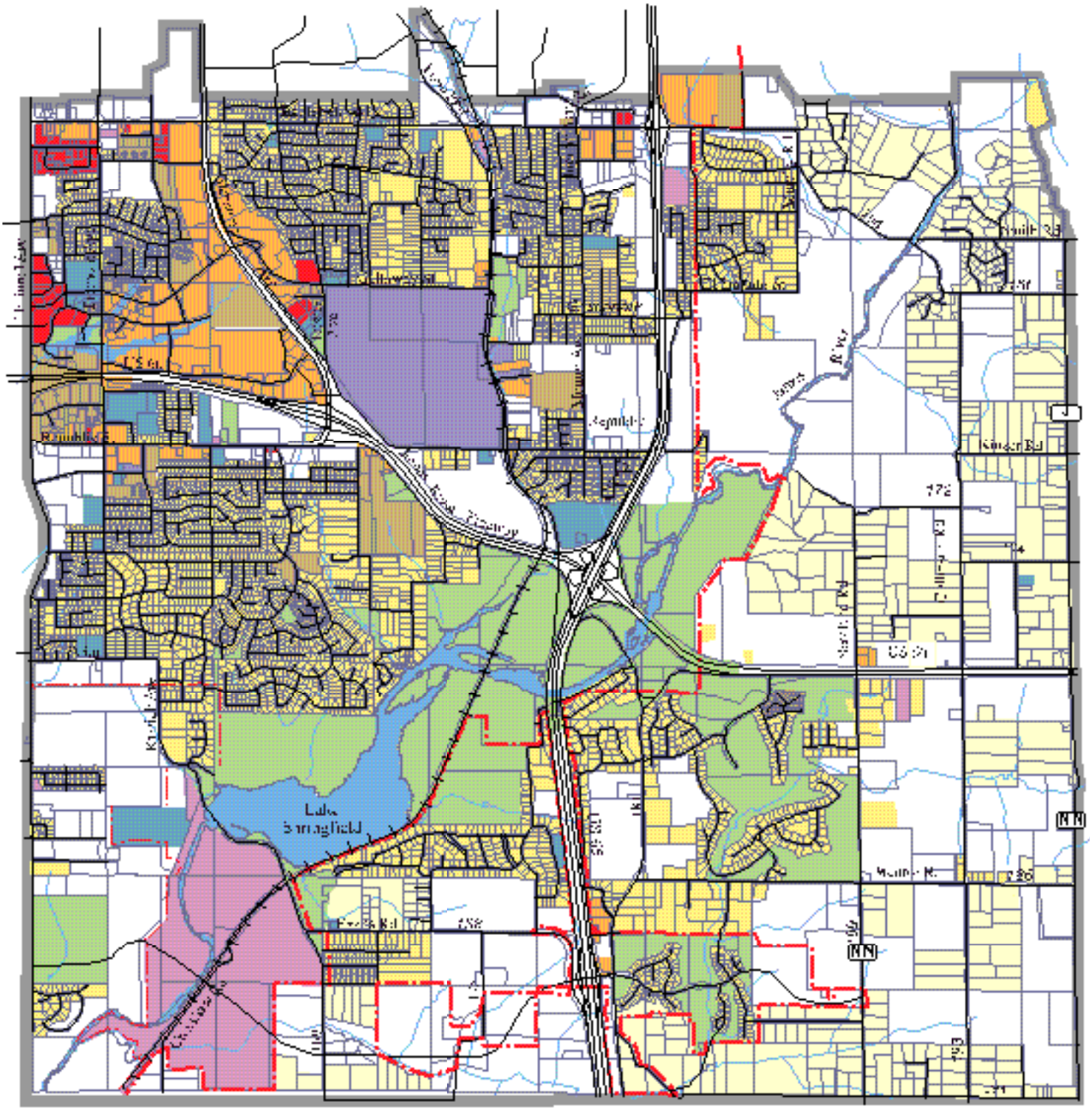
There is a public elementary school east of Mentor Avenue just south of Battlefield Road.

Major Undeveloped Properties

There are several large tracts that are open and undeveloped or otherwise amenable to different use in the future:

The Quarry: The Conco Companies Quarry, bounded by Galloway and Republic Roads and Luster Avenue and Lone Pine Road, is almost one square mile in size. It is actively used to mine limestone gravel for concrete and other uses, and its life expectancy is at least another 25 years. Its northern, western and southern walls are sheer drops, and portions of its floor are 100 feet below the surrounding grade. Access to the quarry floor is via Lone Pine Road, which is where the concrete plant is located. This site has long-term potential for dense and multiple-use urban development, including ponds and park space because of its size, integrity, location, road service and nearby land uses. Road access would have to be amended somewhat to accommodate intensive development of this site, but that day is far in the future.

US 65 North of Republic Road: Open land exists between Gasconade Street and Republic Road on both sides of US 65. Unfortunately, there is no direct access to those properties from US 65 and even the indirect access is poor. Development for anything but single-family housing is dependent on a new highway interchange. Receiving permission for that interchange and paying for it are both problematic, as described under the Road System section of this Analysis of Conditions.



CITY of SPRINGFIELD

Southeast Springfield Development Study

Figure 4

Land Use Pattern, 2001

The James River Valley: There are many hundreds of acres of open land in the James River valley, much of which is regulated as floodplain or floodway, and some of which is publicly owned as part of the Springfield Nature Center. However, some of that property is available for urban development, including the land mentioned above that is east of US 65 and south of Gasconade Street that is presently used for cattle grazing. Refer to Figure 9 to see the limits of the regulatory floodplain along the James River in that vicinity.

US 65 at the Evans Road Interchange: West of the interchange of US 65 and Evans Road, there are several tracts of 40 or more acres that have been or can be assembled for serviced urban development. Presently, the road connection on this side of the interchange is indirect. An arterial road with generous landscaping, bicycle lanes and sidewalks is planned to make a more direct connection to the Evans Road interchange and link across the southern edge of Springfield all the way to the Kansas Expressway and beyond.

East of the Evans Road interchange much of the land has been devoted to a golf course residential neighborhood, thus underutilizing the public investment in the interchange and reducing the connectivity of the frontage roads.

East of the James River and North of US 60: There are several large open tracts east of the James River valley and north of US 60 but they are scattered among areas of five- and ten-acre lots, which prohibit urban development.

South of US 60 and East of US 65: As with the northwestern quadrant of the Study Area, this sector has several large tracts interspersed among large-lot urban subdivisions and semi-rural lots split off along the County roads.

Zoning

The pattern of zoning is illustrated by Figure 6 and includes zoning from both the City and the County.

Springfield: The zoning for the developed land in the City's portion of the Study Area reflects how it is used, mostly single-family housing, multi-family housing and commercial. The major undeveloped tracts in the City are zoned for industry (the quarry) and single-family housing.

Greene County: Most of the Study Area that is under the jurisdiction of Greene County is zoned A-1, Agriculture, which allows farming as well as housing on lots five acres or greater in size. The *Vision 20/20* comprehensive plan recommended that the five-acre zoning be eliminated in favor of a pattern of 4 houses per 40 acres with a minimum lot size of 3 acres or enough land to meet the County's requirements for a septic system and private well.

The next largest Greene County zoning area in the Study Area is R-1, which allows housing on parcels as small as 10,000 square feet if they are served by public sewer and water. Those utilities were extended into Greene County east of US 65 near Battlefield Road and west of US 65 near Evans Road without requiring annexation. The present policy requires an annexation agreement prior to receiving City utility service.

Planned Land Use from Vision 20/20

There are four major elements from the *Vision 20/20* Growth Management and Land Use Plan that apply to the Study Area:

1. The Urban Service Area
2. The Activity Center concept
3. The Land Use Plan map
4. The Springfield-Greene County park system plan

The Urban Service Area

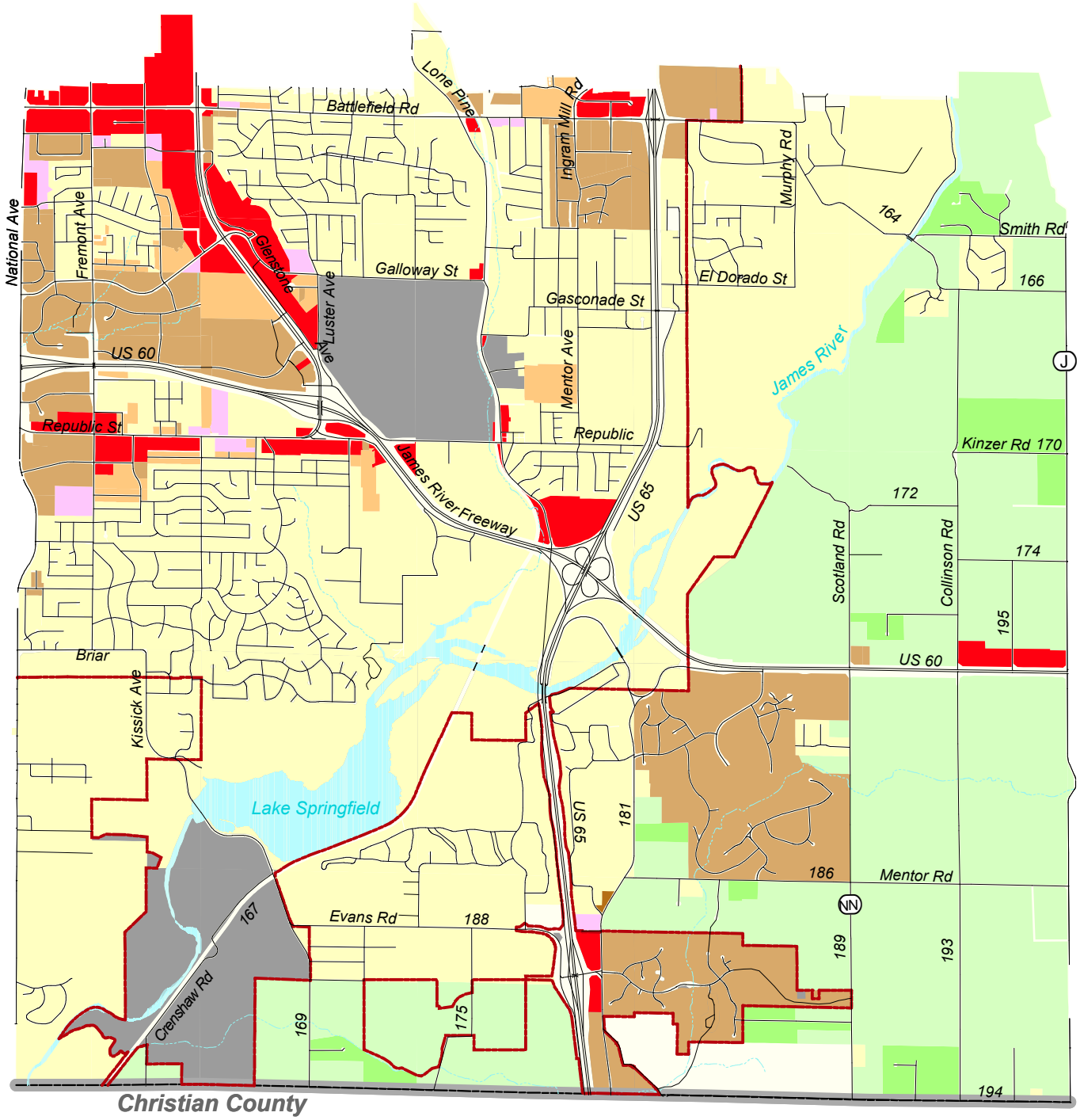
Nearly the entire Study Area is within the Springfield Year 2020 Urban Service Area. The Urban Service Area is where the City intends to provide sewer services and the County will consider building urban roads. However, the Urban Service Area does not imply a timetable for providing these services.

The most easterly half-mile of the Study Area is outside the Urban Service Area but in the Urban Reserve. The boundary of the Urban Service Area can be expected to be revised periodically so that an adequate amount of developable land is provided to meet market needs without unduly increasing land prices or to address environmental concerns. A more complete description of the Urban Service Area can be found on pages 18-15 through 18-21 of the *Vision 20/20 Growth Management and Land Use Plan*.)

The Activity Center Concept

Vision 20/20 proposes three Activity Centers in the Study Area: (1 north of US 60 east of the James River, (2) west of US 65 at the Evans Road interchange. And (3) near Glenstone Avenue and the James River Freeway. The *Vision 20/20 Growth Management and Land Use Plan* describes Activity Centers as follows:

> Activity Centers, whether existing or potential, will be locations of significant business and high-density housing development. Examples would be Greater Downtown, the Battlefield-Glenstone retail area, Highway 65 at Evans Road, and I-44 at Highway 65.
>
> It is intended that additional development be concentrated in and around the Activity Centers so as to optimize transportation investments, citizen convenience, investor confidence, a compact growth pattern, and a sense of urban excitement. Land in each Activity Center would be intensively and efficiently used.
>
> Of course, the Activity Centers would not be the only locations in Springfield and Greene County for businesses or multiple-family housing.



LEGEND:

- Street Centerline
- County Boundary
- City Limits
- Minor Stream
- Major Stream
- Low-Density Residential District
- Medium-Density Residential District
- High-Density Residential District
- Commercial District
- Industrial District
- Planned District
- Office District
- Agricultural Residence District
- Agricultural District

0 1/4 1/2 3/4 1 Mile

North

10 AC
40 AC

CITY of SPRINGFIELD

Southeast Springfield Development Study

Figure 5

Zoning Pattern, 2001

However, it should become the policy of the City and County to promote relatively dense and diverse concentrations of these and other land uses so as to create positive synergy among the Activity Centers.

This combination of access, density and diversity would allow the Activity Centers to grow into community focal points. In this manner, the Activity Centers could help hold Springfield together as a municipality and an integrated metropolitan area, although one with multiple centers.

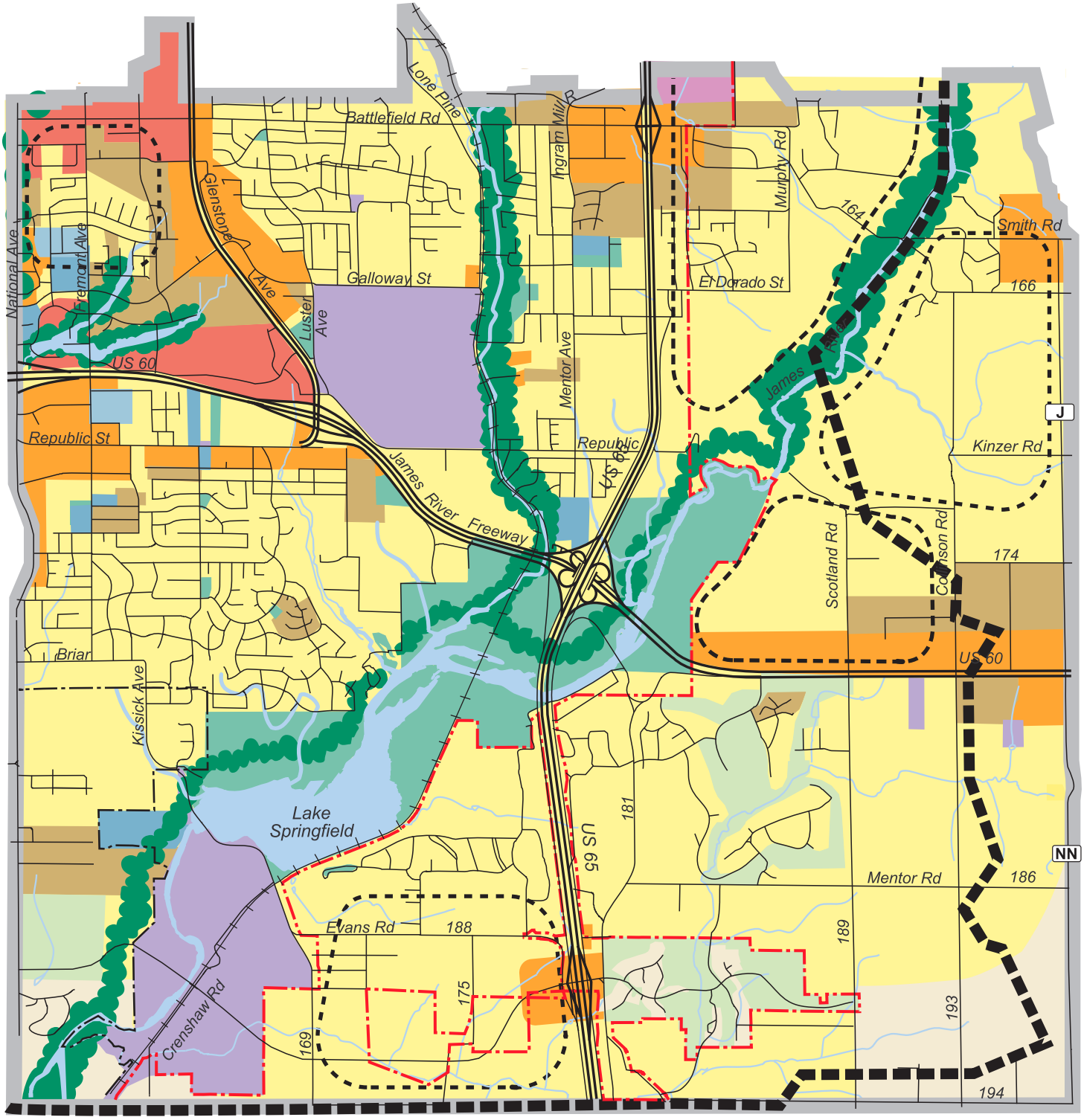
The elements of an Activity Center will vary from one to another, but each should include, at a minimum, retail and office buildings and, ideally, multi-family housing, restaurants, and hotels, entertainment, and community facilities such as churches, public agencies, libraries, parks, etc.

Activity Centers should have slightly different roles in the Springfield urban fabric and would share many characteristics but differ in their emphases. For example, Center City might focus on offices, entertainment, culture and education while Battlefield-Glenstone-James River Freeway (B-G-JRF) might concentrate on retail and service businesses, hospitality and multiple-family housing. Likewise, Center City would have a stronger orientation toward transit, pedestrian movement and public space than the B-G-JRF area.

All Activity Centers should be important locations of development, investment, jobs and services. They should be diverse, would be served by all major and alternative transportation modes, and would be focal points of public investment.

Activity Centers should epitomize many of the desirable design principles of a town or city, but accomplish them on a smaller scale. Therefore, these design principles should be observed when preparing or reviewing plans for an Activity Center:

- Each should have a diversity of uses and users
- Each should have attractive and useable public space toward which the private development is oriented.
- Each should accommodate the pedestrian, the bicyclist and the transit user
- Each should have a link, either direct or indirect, to the regional open space network
- Each should have a definable center and edge.



Low-Density Housing
Medium or High Density Housing
Medium Intensity Retail, Office or Housing
High Intensity Retail, Office or Housing
Greater Downtown
Business Park
Light Industrial, Office and Office-Warehouse
General Industry, Transportation and Utilities
Urban Reserve Area
Rural Area
Park
School
Open Space; Golf
Community-Public
Grennway
Greenway Connector
Neighborhood Park Search Areas
City Boundary
Urban Service Area Boundary, Year 2020
Urban Reserve Boundary, Year 2040

0 1/4 1/2 3/4 1 Mile

North

10 AC
40 AC

CITY of SPRINGFIELD

Southeast Springfield Development Study

Figure 6
Planned Land Use from *Vision 20/20*

The Land Use Plan Map

A portion of the *Vision 20/20* land use plan map is shown by Figure 6. Most of the Study Area is planned for low-density housing, which includes detached housing units up to six units per acre. Medium and high-density housing is guided along the north side of US 60 east of the James River valley, and the west side of the Evans Road interchange is planned for medium-density housing and retail businesses. The quarry is planned for industrial use for the foreseeable future, and land along Glenstone Avenue is shown as business. Another node of business and medium- or high-density housing is planned near US 65 and Battlefield Road.

The Park and Greenway System Plan

The Parks, Open Space and Greenways Plan Element of *Vision 20/20* calls for several elements in the Study Area:

Greenways: Greenways are a major element of the Vision 20/20 plan. They are linear public parks, usually located along both sides of a stream, and include bicycle paths and pedestrian paths. Greenways provide recreation, flood control, runoff filtration and habitat protection. Three are proposed here:

- Galloway Creek Greenway
- James River Greenway
- Part of the Ward Branch Greenway

Open Space: The Springfield Nature Center is located along the James River.

Neighborhood Parks: Several parks of approximately 10 to 15 acres in size could be sited in the southwest, southeast and northeast quadrants of the Study Area. Facilities in those parks could include ballfields, picnic areas, children's play equipment and passive open space.

Community Park: The Lake Springfield Metropolitan Community Park is planned near James River. This property, located on both sides of Lake Springfield and totaling 207 acres, is presently owned by City Utilities and used for picnicking and fishing.

Road and Transit Systems

Road System

The expressway and freeway system in the Study Area is illustrated by Figure 7 and includes:

- US 65
- US 60 (James River Freeway west of US 65)
- Glenstone Avenue

Primary arterial roads include:

- Battlefield Road
- National Avenue
- Republic Road
- Highway J / NN

Secondary arterial or collector roads include:

- Battlefield Road
- Fremont Avenue
- Lone Pine Road
- Mentor Avenue
- Scotland Road
- Collinson Road
- Briar Road
- Kissick Road
- Farm Road J (Farm Road NN south of US 60)
- Evans Road
- Farm Roads, 164, 174 and 194 (all east-west)
- Farm Roads 169, 175 and 181 (north-south).
- Galloway Street

Interchange of US 60 and 65

The Missouri Department of Transportation was studying this interchange during the course of the *Southeast Springfield Development Study* to determine how it should be upgraded. A fully-directional design is preliminary favored by the Department.

Potential New Interchange along US 65

A new interchange along US 60 between the US 60-65 interchange and Gasconade Street would be needed if landowners in that vicinity hope to develop their property to an intensity greater than single-family housing. An interchange there would also aid the intensive re-use of the quarry. The questions are cost, cost responsibility, minimum spacing from the interchange of US 60 and 65, and adequate arterial road connections.

The Missouri Department of Transportation is considering a policy that requires at least two miles between interchanges. Republic Road is only about two-thirds of a mile north of the 60-65 interchange; the location indicated on Figure 11 is one mile north. The collector-distributor roads associated with the potential fully-directional interchange at US 60-65 would make it more difficult to achieve adequate ramp length and weaving space.

Another requirement would be an adequate connecting arterial road, and the current conditions along Republic Road make it very difficult to achieve the required arterial design. An interchange at that location is not presently in the system plan.

East-West Arterial in the Northern Quadrants

It is essential for Springfield to create an arterial road system that does not rely on the federal highway network, in this case US 60 and 65. This means that there should eventually be an east-west arterial road connecting Glenstone Avenue and Highway J / NN that is aligned approximately halfway between Battlefield Road and US 60. Thus, even if there is no new interchange along US 65 in that vicinity, there should at least be a bridge over US 65 with an arterial road running east across the James River and an arterial running west to Lone Pine Road and eventually to Glenstone Avenue.

An arterial road running west of US 65 might involve displacing current housing, such as the mobile home park west of Mentor Avenue. An arterial road running east from US 60 would have to bridge the James River and climb a steep, wooded ravine.

Interchange of Glenstone Road and James River Freeway: This complex interchange is planned to be redesigned and upgraded to accommodate additional traffic. The issue related to the interchange is how to connect a future east-west arterial (see above) to Glenstone Avenue. Particularly, how direct should the connection be to Republic Road? If Republic Road is used as the east-west arterial, that connection would be more crucial.

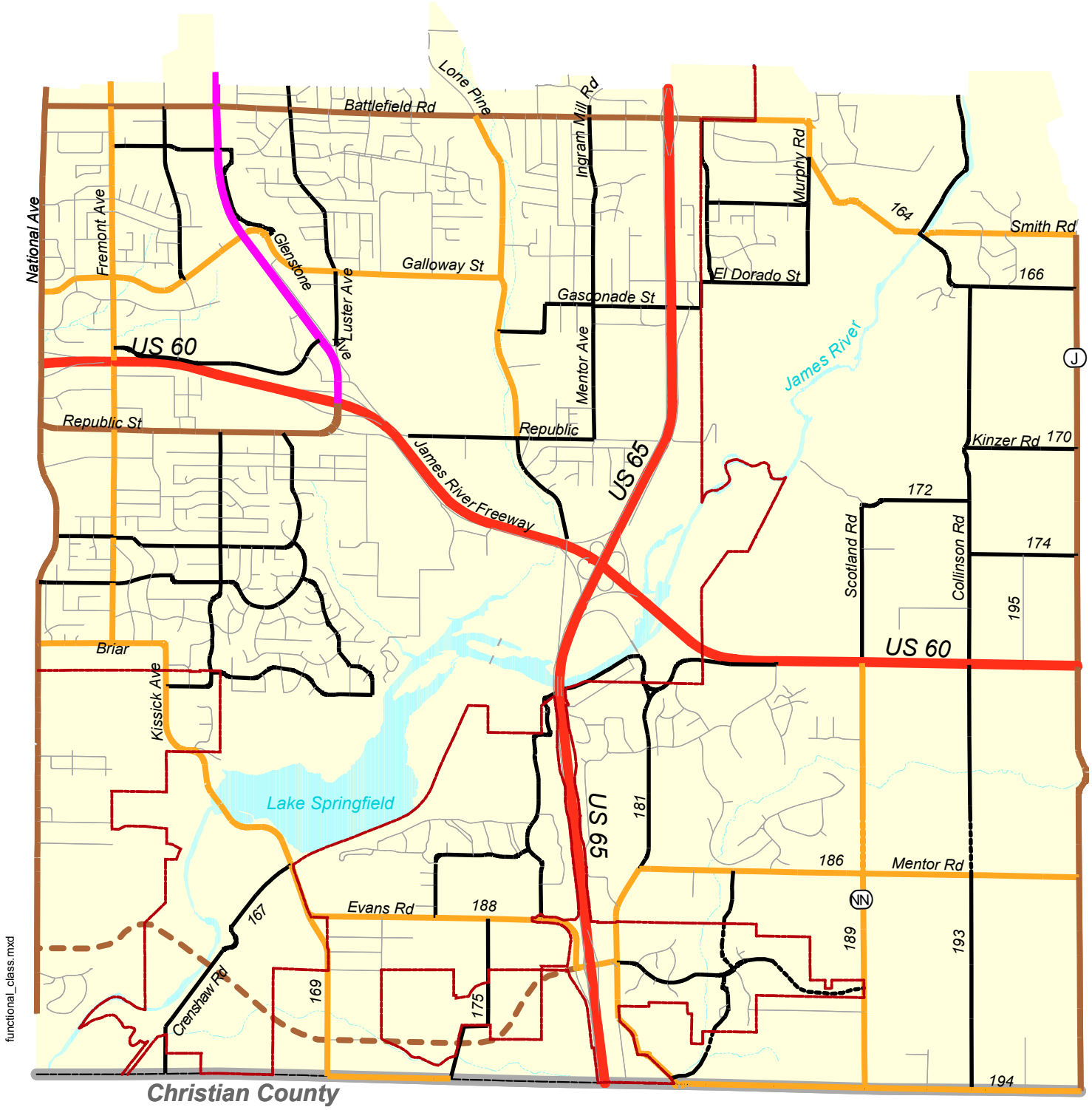
Republic Road: Republic Road was assumed at the outset of this study to be a candidate as an east-west arterial road with an interchange at US 65. However, upgrading Republic Road to arterial dimensions is limited by the closeness of housing, the limited width of the right-of-way, the steep slope near Lone Pine Road and the difficulty connecting to the road system to the west.

Railroad Crossing of James River Freeway (US 60)

The James River Freeway ought to pass over this active rail line after the US 60-65 interchange is rebuilt.

Potential Interchanges along US 60

US 60 east of US 65 is planned by the Missouri Department of Transportation to be upgraded to freeway status like the James River Freeway. That means that the current at-grade intersections along US 60 would be closed and access to the County roads in the northeastern and southeastern quadrants of the Study Area would be available only via one or more new interchanges.



functional_class.mxd

LEGEND:

- County Boudary
- City Limits
- Minor Stream
- Major Stream
- Freeway
- Expressway
- Primary Arterial
- Secondary Arterial
- Collector
- Local
- Planned Primary Arterial
- Planned Secondary Arterial
- Planned Collector

0 1/4 1/2 3/4 1 Mile

North

10 AC 40 AC

CITY of SPRINGFIELD

Southeast Springfield Development Study

Figure 7

Road System

Logical interchange locations would be at Scotland Road and Highway J / NN. However, the MoDOT spacing policy would probably not allow an interchange at Scotland Road since it is only about 1.4 miles from the US 60-65 interchange. Collinson Road would be another candidate, but that would eliminate the interchange at Highway J / NN, which is designated in the *Vision 20/20* transportation plan as the north-south principal arterial in this vicinity.

Evans Road Interchange

Preliminary analysis indicates that that the Evans Road diamond interchange along US 65 will have capacity problems before its service area is fully developed.

East-West Arterial in the Southeast Quadrant

The design of Millwood Drive through the neighborhood east of the Evans Road interchange is not suitable as an arterial road that serves the southeastern quadrant of the Study Area. This means that another alignment, perhaps Mentor Road (Farm Road 186), should be considered for this east-west arterial function.

East-West Arterial in the Southwest Quadrant

An east-west arterial road has been planned to link from the Evans Road interchange to the Kansas Expressway and beyond. In the southwestern quadrant of the Study Area, there are two alternative alignments for this road, which is expected to include trees, bicycle lanes and sidewalks. One or more strong north-south road connections will also be needed from this quadrant into Christian County.

Evaluation criteria for the alignment decision include impact on Farmer's Branch Creek and its floodplain, impact on existing houses, visual effect, tree loss, slope cutting and filling, traffic flow and cost. Another consideration is how this arterial road complements adjacent land development with its landscaping or constrains it with its intersection spacing limitations.

East-West Arterial along the Northern Perimeter

There is a need to have an adequate traffic link from the Battlefield Road interchange across the James River to Highway J / NN.

North-South Arterial along the Eastern Perimeter

Highway J / NN is the designated primary arterial road in this vicinity. North-south movement east of Glenstone Avenue (not counting US 65) is inadequate, so it is important to plan, reserve and build a north-south road in this corridor with sufficient capacity. Access to arterial roads from local streets or driveway should be limited so as to protect the traffic capacity of the arterial road.

Transit Service

Fixed-route transit service in Springfield is provided by City Utilities and focuses on four principal destinations: downtown, Southwest Missouri State University, the library center and Battlefield Mall. The downtown is the hub of the system, and buses arrive and depart from the Park Center Transfer Facility on a "pulse" basis with most buses arriving and departing at the

same time. City Utilities also operates complementary demand-responsive curb-to-curb para-transit service consisting of five vans for the disabled.

Fixed-route bus service is provided in the Study Area along Battlefield Road, Glenstone Avenue, and Galloway Street from Primrose Market to National Avenue. At this time, there are no plans to expand the service into the rest of the Study Area. However, routes could be extended to the south and east when urban densities of development are achieved. A major opportunity for transit service might include the potential mixed-use development at the Conco quarry site after mining is completed in 25 years or more.

Public Sewer and Water Systems

As noted above, nearly the entire Study Area is within the Year 2020 Urban Service Area, which makes it eligible for sewer service and urban roads.

Public sanitary sewer service is very important in the Springfield vicinity because of the nature of the soils, bedrock and many sinkholes. The rocky and fractured local geology siphons surface water and on-site septage quickly to the aquifers. Thus, public health depends on the use of a closed sewer system and/or properly sited, installed and maintained on-site disposal systems.

Urban development in the Study Area is supported by City sewer and water lines and is mostly in the City of Springfield. All City neighborhoods in the Study Area are served with sanitary sewer lines except for the area west of US 65 near Gasconade Street.

However, there are two locations in Greene County that have received both City water or sewer service without annexation:

1. Between US 65 and the James River

2. South of US 60 and east of US 65 there is both City sewer and water, although the Millwood golf course neighborhood is in the City of Springfield

There are two locations in Greene County that have City water service but not City sewer service:

1. East of the James River and north of US 60

2. West of US 65 at Evans Road. The Farmer's Branch Sewer main runs through this quadrant but there are no lateral connections yet. Annexation will be required to receive those connections, consistent with current City policy. The small-lot housing in the northern part of this area is running the risk of severe groundwater and surface water contamination because of the density and number of its aging individual sewage systems. That density of development would not be possible without the City water lines.

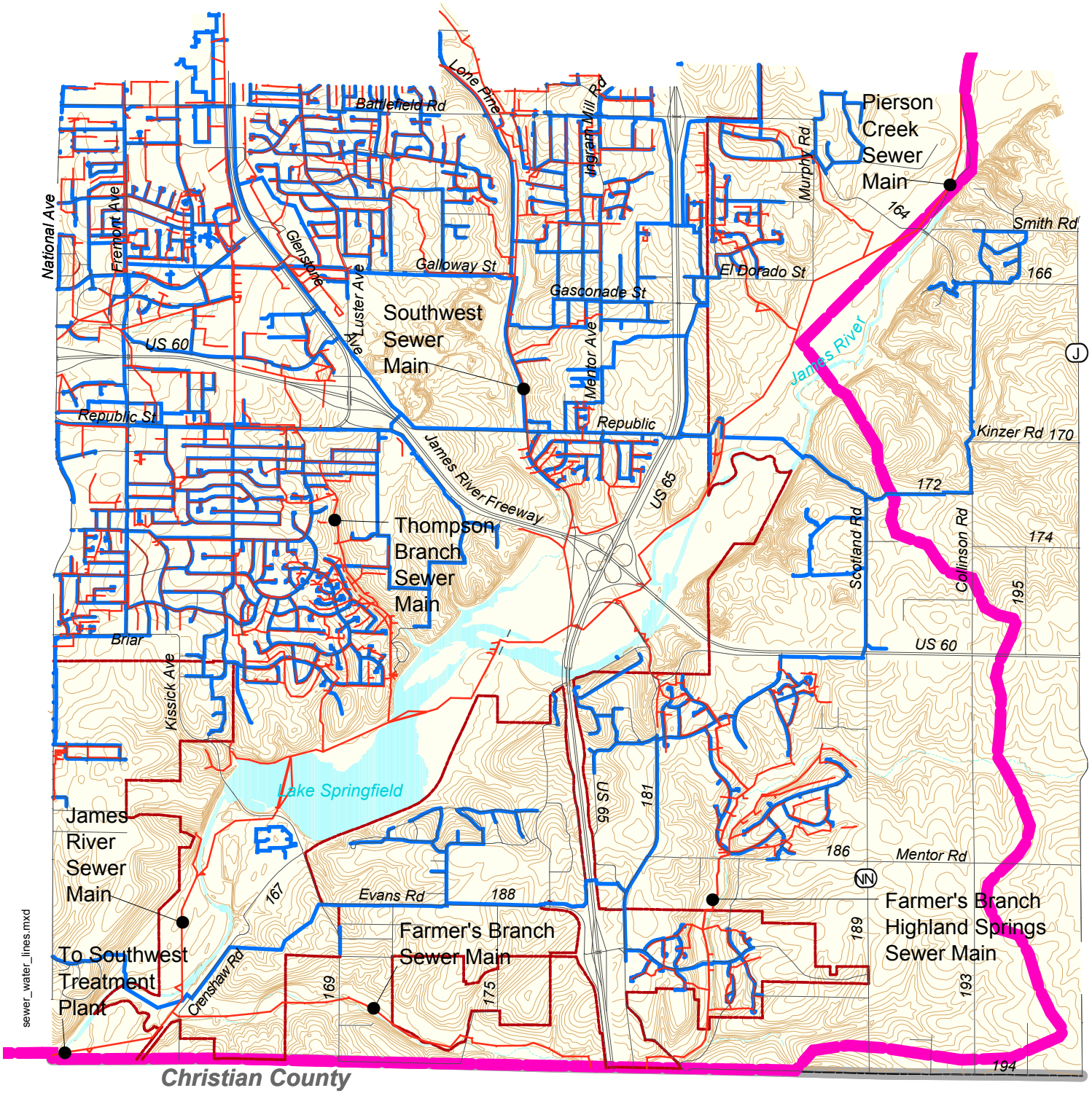
There are four major sewer lines in the Study Area, as illustrated by Figure 8:

Northwest:	Southwest Interceptor Sewer
West-Central:	Thompson Branch Interceptor Sewer
Northeast:	Pierson Creek Interceptor Sewer

South and Southeast: Farmer's Branch Interceptor Sewer

These main sewers have been designed to accommodate flows from secondary lines that serve large areas, including all of the Study Area.

The Pierson Creek and the Farmer's Branch lines will make it possible to serve all the undeveloped Greene County property in the Study Area except as constrained by the economics of serving the semi-rural lots. As indicated previously, those 3- to 10-acre lots will effectively prohibit the full use of public investments in sewer lines, water lines, roads and parks while threatening groundwater supplies with their on-site sewage systems.



LEGEND:

- Topographic Contour Line
- Sewer Line
- Water Line
- Street Centerline
- Urban Service Area Boundary
- County Boundary
- City Limits
- Minor Stream
- Major Stream

0 1/4 1/2 3/4 1 Mile

North

10 AC 40 AC

CITY of SPRINGFIELD

Southeast Springfield Development Study

Figure 8

Public Sewer and Water Systems

Streams and Floodplains

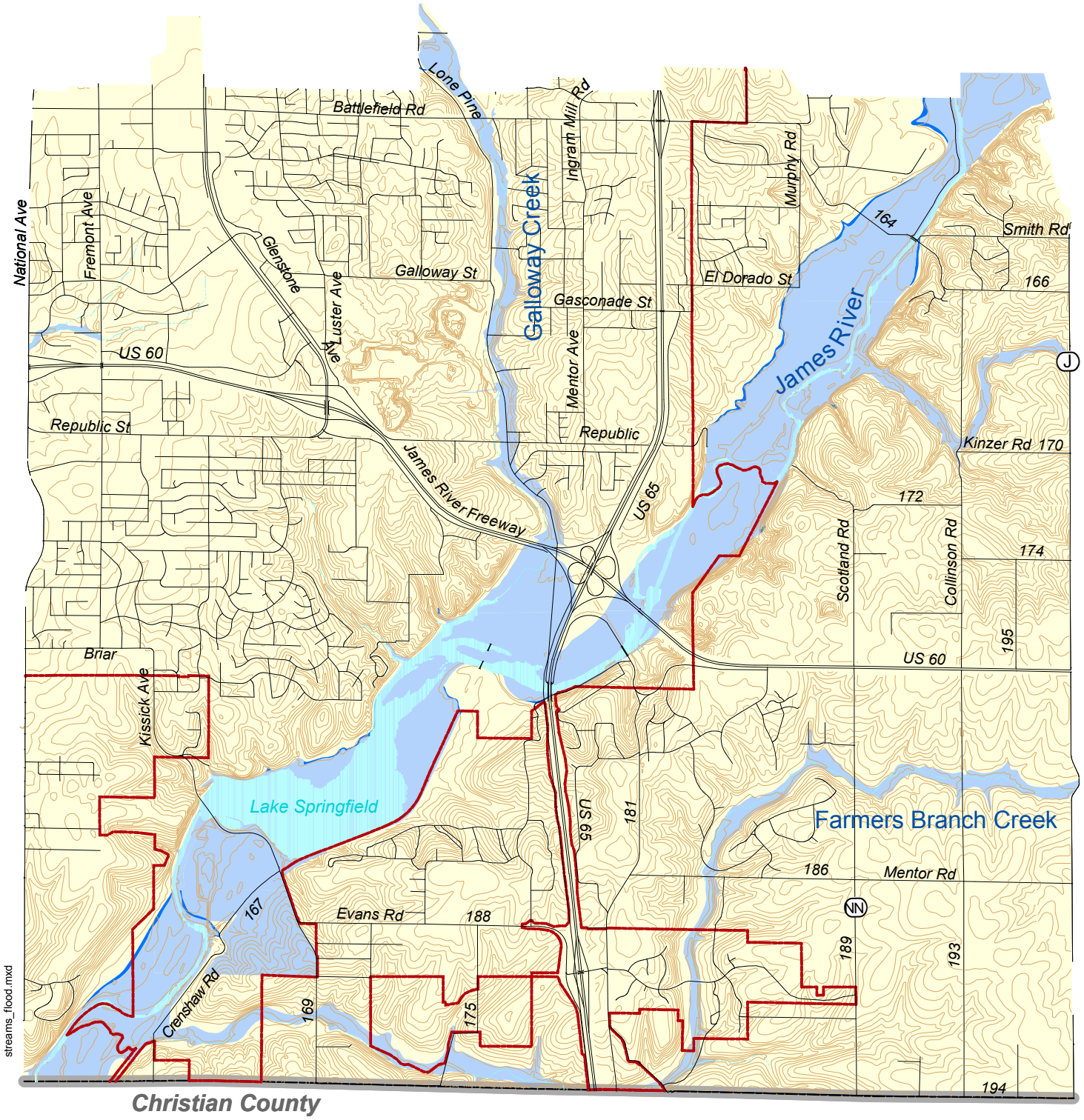
There are four streams running through the Study Area:

James River: This major stream flows northeast to southwest across the Study Area and has a major floodplain, as indicated by Figure 9. Lake Springfield was created by a dam near Kissick Avenue by the Board of City Utilities to act as a cooling water supply for their power plant. The river alley is broad and steep with a broad floodplain, exposed limestone bedrock and many forested areas. US 60 and 65 negatively affect the James, as they both cross the river and intersect in the river valley.

Galloway Creek: This minor stream runs in a narrow but steep valley and is bordered by Lone Pine Avenue, an asphalt bicyclist path and Sequiota Park.

Farmer's Branch Creek: Like Galloway Creek, this stream valley is dramatic.

Pierson Creek: Pierson Creek is tributary to the James River just north of the Study Area.



LEGEND:

- Street Centerline
- County Boundary
- City Limits
- Minor Stream
- Major Stream
- 100 Year Flood Zone
- 500 Year Flood Zone

0 1/4 1/2 3/4 1 Mile

North

10 AC
40 AC

CITY of SPRINGFIELD

Southeast Springfield Development Study

Figure 9

Streams and Floodplains

Slopes, Sinkholes and Major Forested Areas

Slopes

Steep slopes are a development limitation for roads and buildings, particularly commercial buildings, in several locations.

The topography of the Study Area is hilly and steep, as indicated by Figure 10. The most dramatic slopes are associated with the James River valley, but Galloway and Farmer's Branch Creeks have also cut impressive ravines. There is a 180-foot difference in elevation from the James River to the top of the eastern bluff north of US 60. Slopes are more rolling as the distance from the James River increases. There are also steep slopes in the Galloway Creek and Farmer's Branch Creek valleys, and the southwest quadrant of the Study Area has several hills in the vicinity of the creek.

Sinkholes

Sinkholes are a development limitation and an environmental concern in many locations around Springfield and across the Ozark plateau. Figure 10 indicates that a band of sinkholes has been identified east of the James River and near Scotland and Collinson Roads. Housing can be built around these sinkholes but septic tank drainfields and surface drainage must be directed away from them.

Sinkholes are depressions on the surface of the earth caused by the collapse of a cave. They become a drain, connecting the surface drainage and underground drainage systems. Collectively, this landscape is known as karst topography. There are over 1,000 known sinkholes in Greene County. Most of these are bowl-shaped, with a shallow alluvial cover, and range in size from ten feet in diameter to over 180 acres, and from less than ten feet to over 60 feet in depth.

Many problems arise from sinkhole areas. Because of the internal drainage of karst areas, water can pond in the sinkholes and drain very slowly, with the potential of flooding nearby houses and businesses. Any attempt to fill a sinkhole will displace water onto adjacent land.

Because of the vertical action of solution, sinkholes become ready access points to the subsurface water system, causing a potential for groundwater contamination. Here, the water can move rapidly into the system without any cleanup of the contaminants it contains.

Sinkholes are also unstable and may subside as more solution takes place. Therefore, care must be taken in any construction in a sinkhole area to accommodate the subsidence. Sinkholes may collapse as more subsidence occurs over a cave area, creating an effect known as a doline, a common occurrence in Greene County.

Care must be taken when constructing sewage lagoons and septic tank systems because of the connection between of the sinkhole and the shallow groundwater system. Sinkhole areas should be avoided for this type of activity.

If construction requires filling a sinkhole, the system should be kept open by some type of drainage system to avoid disrupting the subsurface drainage system causing future problems such as collapse and surface water displacement.

Major Forested Areas

Forests are an amenity for housing development in several locations in the Study Area. In combination with the slopes and streams described above, these woods create the attractive natural character of the Ozarks that is sought by many residents.

The major wooded areas are on the eastern bluff of the James River north of US 60, along Galloway and Farmer's Branch Creek, and in several locations in the southwestern quadrant of the Study Area. Immediately west of the Evans Road interchange there is a sizeable forested tract that would compete with the potential road extension and commercial development. Away from the streams, particularly in the eastern fringes of the Study Area, the land tends to be more open and less wooded.

Development Market

There are many reasons to believe that residential and, to a lesser extent, commercial development have great potential in the Study Area.

- Springfield has a strong and increasingly diversified economy that has resulted in steady housing growth over the past two decades, particularly in the southern fringe of the urban area.

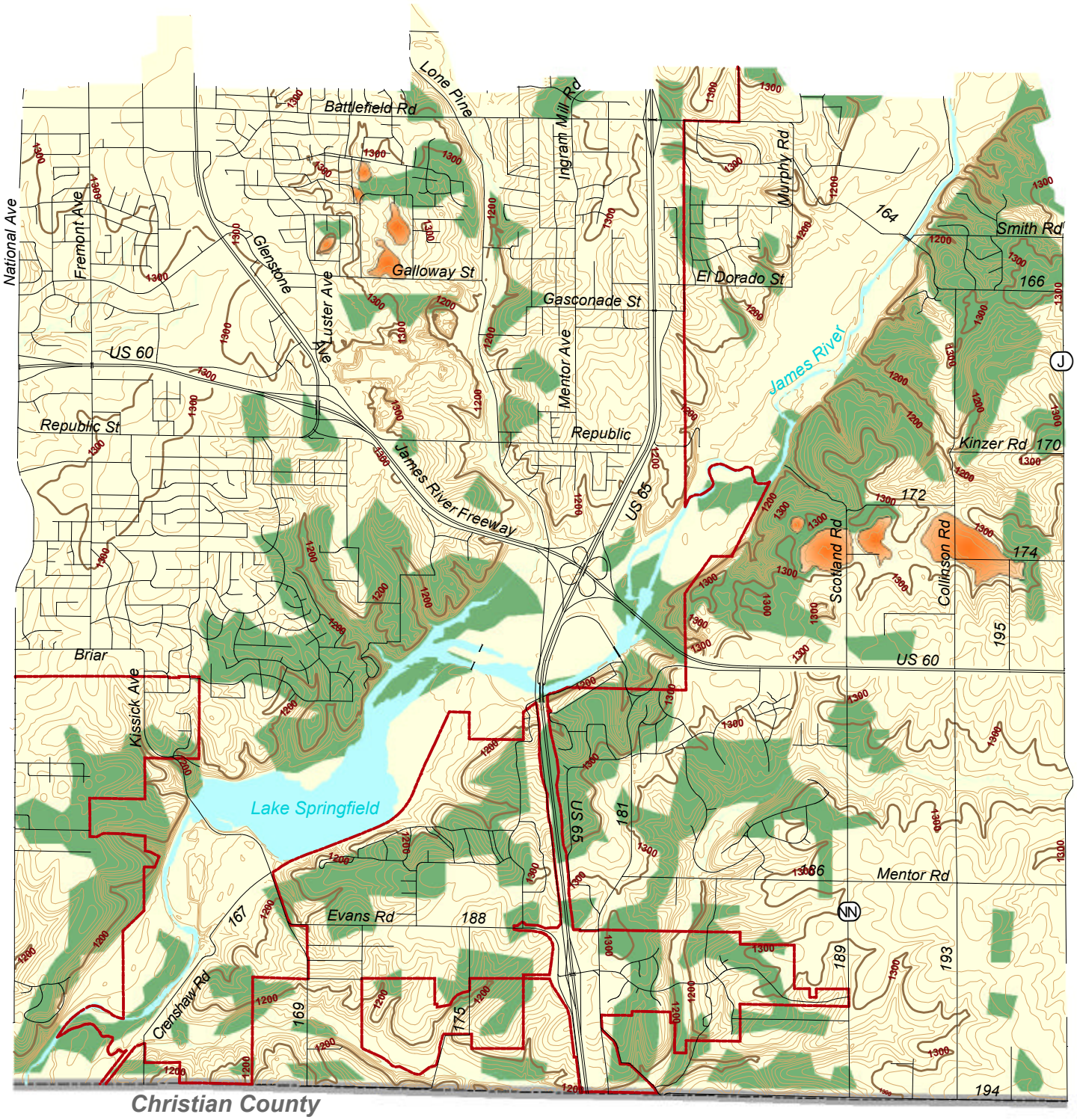
- The Millwood and Highland Springs golf neighborhoods have established a positive image for the Study Area.

- US 65 is a major link to the popular and fast-growing markets in Branson and the southern Ozarks lakes territory.

- US 60 and 65 provide good auto movement to the Study Area, although interchange limitations may inhibit specific property access. Utilities are available to support urban development.

- Christian County communities such as Nixa and Ozark are booming, although the quality of the commercial development in and near those cities is judged to be moderate at best relative to recent projects in Springfield.

However, there are several competing commercial locations that are closer to the Springfield market and which also have good access and strong demographics in their trade areas.



slopes_sinkhole.mxd

LEGEND:

- Street Centerline
- County Boundary
- City Limits
- Minor Stream
- Major Stream
- Topographic Line
- Sinkhole
- Forest Area

0 1/4 1/2 3/4 1 Mile

North

10 AC
40 AC

CITY of SPRINGFIELD

Southeast Springfield Development Study

Figure 10
Slopes, Sinkholes
and Major Forested Areas

Summary of Site Forces

Transportation

Potential New Interchange along US 65: A new interchange along US 65 between the US 60-65 interchange and Gasconade Street would be needed if landowners in that vicinity hope to develop their property to an intensity greater than single-family housing. An interchange there would also aid the intensive re-use of the quarry. The questions are cost, cost responsibility, minimum spacing from the interchange of US 60 and 65, and adequate arterial road connections.

East-West Arterials in the Northern Quadrants: There should eventually be an east-west arterial road connecting Glenstone Avenue and Highway J / NN that is aligned approximately halfway between Battlefield Road and US 60. Thus, even if there is no new interchange along US 65 in that vicinity, there should at least be a bridge over US 65 with an arterial road running east across the James River and an arterial running west to Lone Pine Road and eventually to Glenstone Avenue.

Potential Interchanges along US 60: US 60 east of US 65 is planned by the Missouri Department of Transportation to be upgraded to freeway status like the James River Freeway. Logical interchange locations would be at Scotland Road and Highway J / NN. However, the MoDOT spacing policy would probably not allow an interchange at Scotland Road since it is only about 1.4 miles from the US 60-65 interchange. Collinson Road would be another candidate, but that would eliminate the interchange at Highway J / NN, which is designated in the *Vision 20/20* transportation plan as the north-south principal arterial in this vicinity.

East-West Arterial in the Southeast Quadrant: Mentor Road (Farm Road 186), should be considered for this east-west arterial function.

East-West Arterial in the Southwest Quadrant: An east-west arterial road has been planned to link from the Evans Road interchange to the Kansas Expressway and beyond. In the southwestern quadrant of the Study Area, there are two alternative alignments for this road.

North-South Arterial along the Eastern Perimeter: Highway J / NN is the designated principal arterial road in this vicinity.

Utilities

Sanitary Sewer Service: There are no major development constraints posed by the sanitary sewer system in the Study Area. The northeast is the only quadrant with no lateral service at this time.

Figure 11
Summary of Site Forces

Water Service: There are no major development constraints posed by the water system in the Study Area.

Land Use

Natural Constraints: There are several major natural features that constrain development: the James River and its floodplain, several steep slopes near the streams, a few sinkholes in the northeastern quadrant, floodplains along Galloway and Farmer's Branch Creeks.

Amenities and Opportunities: There are many locations with outstanding natural beauty as a result of the trees, slopes, views and streams.

Man-Made Constraints: The pattern of 3- to 10-acre semi-rural lots, especially in the northeastern quadrant of the Study Area, is a man-made constraint to development. Another constraint is opposition of some Greene County residents, especially those in the southwestern quadrant, to urban-scale development in their areas, particularly businesses.

Guidance from Adopted Plans: *Vision 20/20* calls for intensive and multiple-use development in two locations in the Study Area – one in the northeastern quadrant just north of US 60 and another west of the Evans Road interchange. The quarry was also identified for special use after the mining is completed. New neighborhood parks are needed in three of the four quadrants. Nearly the entire Study Area is within the Urban Service Area.

Expressed Development Interest: At least four sets of landowners have indicated specific plans for the future of their properties:

- The landowners east and west of US 60 in the vicinity of Republic Road have stated interest in building retail business space, offices and/or multiple-family housing in this area.
- The landowners in the southwestern quadrant have submitted a sketch plan to the City for 500 units of single-family and multiple-family housing north of Farmer's Branch Creek.
- A landowner in the northeastern quadrant hopes to plat additional ten-acre lots.
- Another landowner hopes to build a retail center west of the Evans Road interchange.

Development Market: The residential land development market is strong and could absorb new units at several price points, both detached and attached products. The market for commercial space, while strong, competes with other locations that have slightly better locations relative to the bulk of the trade area.

Land Use and Road System Alternatives

Introduction

Three major development alternatives, illustrated by Figures 12, 13 and 14, were drawn to explore the variables in the future road system and land use pattern in order to work toward a preferred design. This section describes the similarities and differences among the three options.

These alternatives were reviewed with officials from the City, the County and the Missouri Department of Transportation, members of the public, landowners and members of the Springfield Planning Commission. Costs for the major differences in the road system were estimated. It was assumed that the sewer and water utility systems could be extended and adapted to serve any of those scenarios.

It was assumed that the final plan would be some combination of the alternatives, perhaps including new ideas. It was not assumed that one of the alternatives would be chosen without alteration.

The pattern of roads and bridges was the major variable among the alternatives, and that infrastructure determined the pattern and intensity of planned land use. Therefore, the description of the alternatives is organized around the road system.

Common Components

Each of the alternatives assumes that:

- The James River floodplain will be protected in private and/or public ownership and that the James River Greenway open spaces and paths will be built.
- The interchange of the James River Freeway and Glenstone Avenue will be redesigned and reconstructed.
- The interchange of US 60 and 65 will be rebuilt, probably using a fully-directional design with the James River Freeway being elevated over the railroad crossing.
- US 60 east of US 65 will be upgraded to a limited-access freeway design.
- There will be a bridge built over US 65 in the vicinity of Republic Road that will provide connections east across the James River and to the west to the Glenstone-James River Freeway area.
- There will be a future east-west arterial road built in the southwestern quadrant that connects to the highway system at Evans Road.

- The future east-west arterial road in the two southern quadrants will be built as a parkway design with trees, extra green space, bicycle lanes and sidewalks.

The sketches for the alternatives illustrate only the land uses in the locations proposed for major change. Other areas have been left uncolored for the sake of clarity.

Overview of the Differences in the Road System

The primary differences in the development alternatives are:

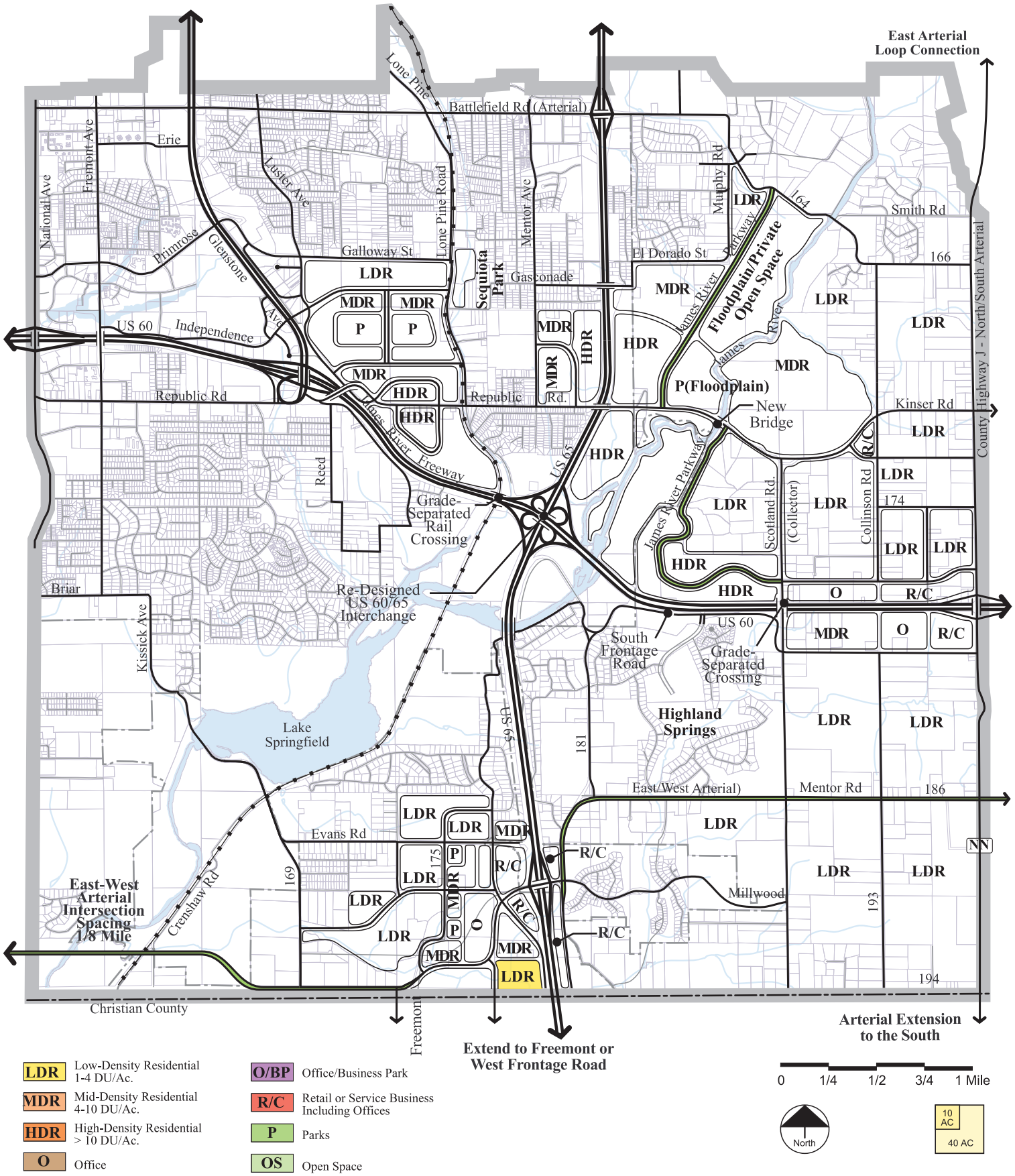
1. **US 65 Interchange:** Whether there will be a new interchange along US 65 in the vicinity of Republic Road and its location.

2. **East-West Arterial Road in the Northern Quadrants:** The alignment of future roads leading east or west from a bridge over US 65 in the vicinity of Republic Road.

3. **Evans Road Interchange:** The design of the Evans Road interchange along US 65. Its location is a secondary variable.

4. **Alignment of the East-West Arterial in the Southwest Quadrant:** Whether the northern or the southern alignment option should be selected

5. **US 60 Interchanges:** The location, number and design of new grade-separated interchanges along US 60 east of US 65. This decision would affect the functional classification of the north-south roads in the eastern quadrants.



LDR Low-Density Residential 1-4 DU/Ac.

MDR Mid-Density Residential 4-10 DU/Ac.

HDR High-Density Residential > 10 DU/Ac.

O Office

O/BP Office/Business Park

R/C Retail or Service Business Including Offices

P Parks

OS Open Space

CITY of SPRINGFIELD

Southeast Springfield Development Study

Figure 12
Land Use and Road System Alternative A

US 65 Interchange

Alternative A shows an additional bridge over US 65 at Republic Road while Alternatives B and C have, north of Republic Road, a new bridge with a diamond interchange..

Building a bridge provides essential east-west arterial movement separate from the federal highway system and provides sufficient circulation to create mid- and high-density housing in the vicinity. Housing density greater than approximately 3 units per acre also depends on building a collector road north to Farm Road 164 and Battlefield Road along with a connection to the road system west of US 60.

The interchange would also support more intensive re-use of the quarry. Offices and high-density housing would probably only be feasible there with the interchange. Otherwise, the site would be limited to low- and mid-density housing and park space.

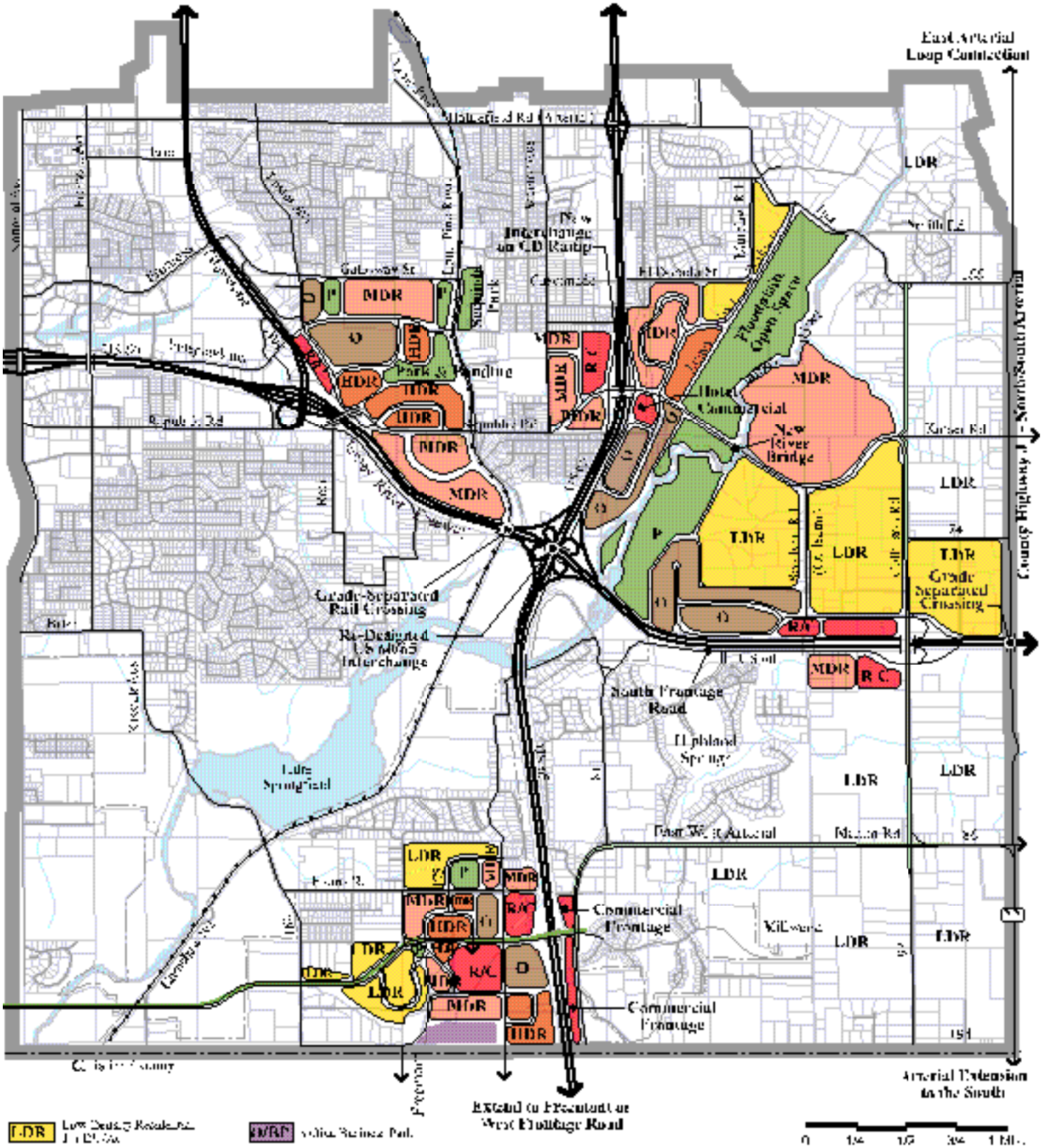
The interchange shown in Alternatives B and C provides sufficient land access that nearby development could be intensified to include retail, office and multiple-family housing construction. A major nearby landowner has requested this improvement.

There are three major questions associated with a new interchange along US 65 in the vicinity of Republic Road:

1. **Is there enough distance between the bottom of the interchange ramps and the ramps associated with the fully-directional interchange at US 60-65?** This was tested by a URS Corporation engineer, and there appears to be enough room for the necessary traffic weaving.

2. **Will a new interchange be allowed there by the Missouri Department of Transportation even if it can be proven to be safely operational?** The Department is considering a policy that would require freeway interchanges to be at least two miles apart. If that policy is adopted, an exemption or variance might be possible if the Department can be satisfied that the traffic conditions will be adequate and the benefits to the community help justify the decision.

3. **Who will pay for the interchange?** This question will have to be answered by the Springfield City Council in light of how the interchange relates to the transportation system and the economic development opportunity it provides.



CITY of SPRINGFIELD

Southeast Springfield Development Study

Figure 13
Land Use and
Road System
Alternative B

East-West Arterial Road in the Northern Quadrants

Alternatives A and B assume that the Republic Road alignment will be used to link west from US 65. Using that route for the connecting arterial would probably require property acquisition along the north side of that road west of US 65 because there is insufficient right-of-way now. The added traffic would also be a negative impact on that neighborhood, and there is a steep slope leading to Lone Pine Road.

Alternative C proposes a more northerly path that might require displacing a mobile home park and/or other buildings. It also assumes a connection to Glenstone Avenue through the redeveloped quarry site after it is retired from mining.

On the east side, each alternative shows a new bridge over the James River and a road link to Kinser Road. There are three different options for new north-south movement along the west side of the James River and indirect connections to Battlefield Road and Scotland Road.

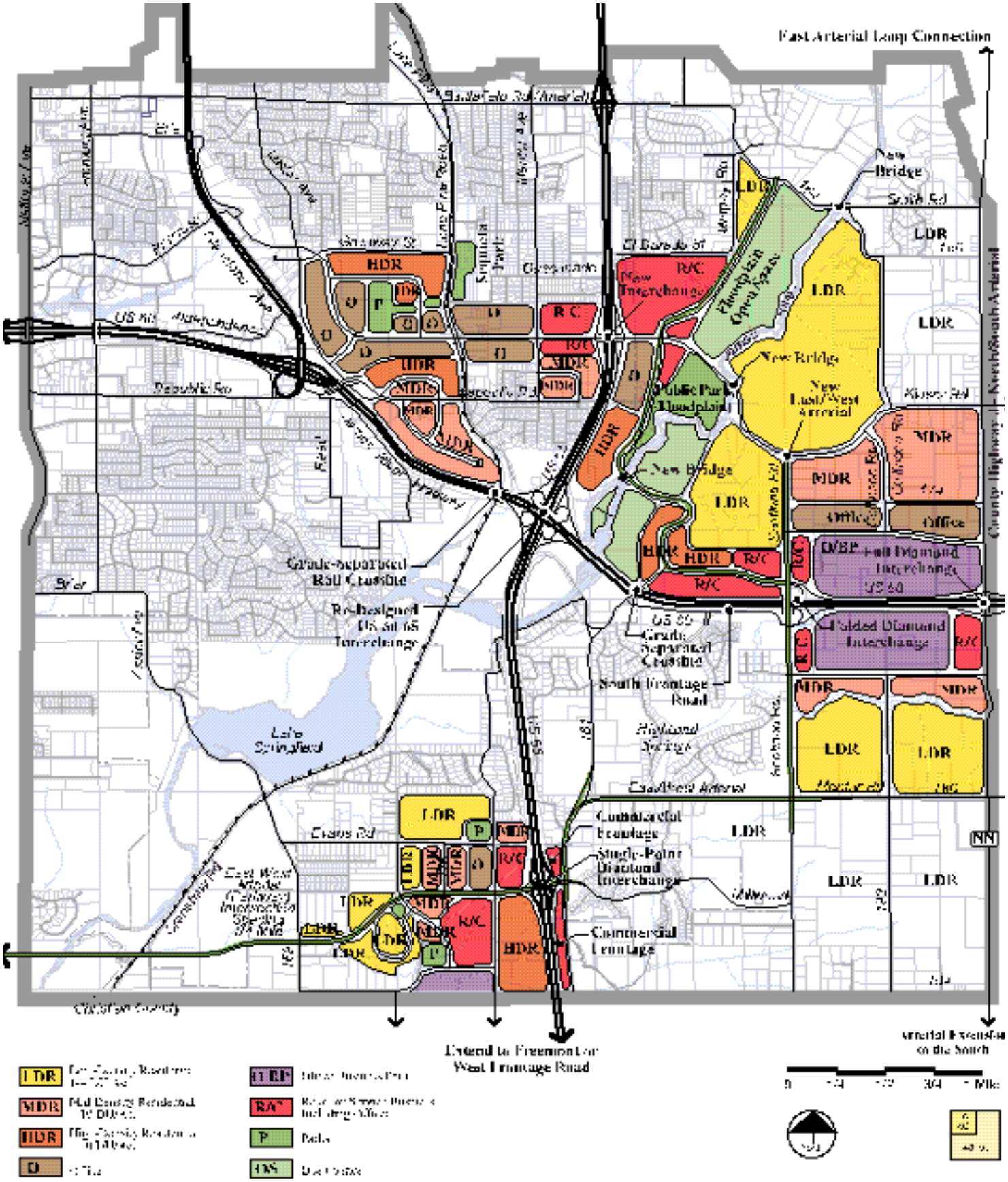
Evans Road Interchange

Alternative C shows a redesigned interchange using a center-point diamond design. That configuration increases the left-turn capacity of the interchange but requires much less land than a loop design. That is important because Farm Road 181 is close on the east side and might conflict with a northbound off-ramp. It is anticipated that the greatest demand increase on that interchange will be for movements eastbound to northbound.

Alignment of the East-West Arterial in the Southwest Quadrant

Several alignments were studied for this road during the preceding two years, and two alternatives remain in this quadrant. The selection will be a matter of weighing their impacts on existing development, Farmer's Branch Creek and planned or proposed development. The land development proposed in the Southwest Quadrant could work with either alignment although the East-West Arterial would allow fewer local street intersections than a collector road.

Most of the land development in the southwestern quadrant will be low density housing, including urban-sized lots served with City sewer. Three different patterns are proposed, with Alternative A being the least intensive and Alternative C the most intensive.



CITY of SPRINGFIELD

Southeast Springfield Development Study

Figure 14
Land Use and Road System Alternative C

All three recommend some combination of retail and office development close to the Evans Road interchange with mid- and high-density housing transitioning to single-family housing.

Because of the hilly conditions, anything other than single-family housing will require a fair amount of grading and filling. In particular, the woods immediately west of the Evans Road interchange would be directly affected.

US 60 Interchanges

US 60, east of US 65, is planned to be upgraded to a limited access highway like the James River Freeway, and the primary candidate for an interchange is Highway J / NN because that road is designated as a Principal Arterial and because it at least two miles from the interchange of US 60 and 65.

Scotland Road would be the second candidate because it is one mile west of Highway J / NN but it is also closer than MoDOT's spacing policy allows. (The same problem as with the proposed "Republic Road" interchange.)

Collinson Road is the compromise candidate, but that would not be consistent with the Major Thoroughfare Plan.

The number and the location of the interchanges guides the type and intensity of land development, especially on the north side of US 60. The most intensive land pattern would occur with two interchanges, as shown under Alternative C. That scenario would come the closest to accomplishing the aims of an Activity Center as proposed in the *Vision 20/20* Growth Management and Land Use Plan.

Objectives for the Study Area

The City of Springfield has several objectives for the *Southeast Springfield Development Study*, and they serve as criteria with which to judge and refine the Alternatives that were presented in the preceding section of this report.

Objectives

1. **Activity Centers:** Promote the creation of Activity Centers as described in the Growth Management and Land Use Plan of *Vision 20/20* including the future uses of the Conco quarry site, the Evans Road – US 65 interchange and the US 60-65 interchange.

2. **Rank Infrastructure Improvements:** Help the City and County determine the priority of road, bridge and utility improvements.

3. **Roads and Bridges:** Recommend a system of road and bridge investments that optimizes through private land development the return on the public's investments.

4. **Neighborhoods:** Promote the development of residential neighborhoods that are attractive and compact, have a diversity of housing types and have lasting value.

5. **Utilities:** Provide for the logical and cost-efficient extension of City sewer and water lines in conjunction with the annexation of property to the City.

6. **Natural Environment:** Protect environmentally sensitive areas such as floodplains, steep slopes and major forested areas.

7. **The Quarry:** Recommend future uses for the Conco quarry site.

Recommended Transportation, Utility and Land Use Patterns

This section describes the recommended transportation, utility and land use patterns for the study area, how they conform with the objectives listed above and how they evolved from the alternatives. The recommended road and land use patterns are illustrated by Figures 15 and 16 (without a new bridge over US 65) and the recommended utility pattern is shown by Figure 17.

These recommendations incorporate the best aspects of the alternative schemes and the comments of citizens and public agency staff.

The organization of this section is parallel to the description of the alternatives.

Overview

The recommended pattern of land use calls for the staged creation of urban-scale residential neighborhood and business sites served by an expanded system of City sewer and water lines and several strategic improvements to the road and bridge system. Several large areas of semi-rural lots will retain at that very low residential density.

These recommendations acknowledge the fact that the possibility of urban growth has been lost for large portions of the Study Area east of the James River because of the pattern of semi-rural lots. However, there still are substantial open areas where sewer, water and local streets could be introduced and the land platted to urban density parcels. Subsequent sections of this report include proposed policies that, if followed, would work to prevent the future loss of such opportunities and safeguard the efficient and economical growth of the region.

Partially as a consequence of the established semi-rural pattern, urban development east of the James River is not expected to be as intense as originally envisioned under the Activity Centers concept of the *Vision 20/20* Growth Management and Land Use Plan. However, there still is expected to be a concentration of retail, office and multiple-family housing development at four locations:

- Evans Road
- The north side of US 60 east of US 65
- The Glenstone Avenue corridor
- The quarry (long-term)

Transportation

US 65 Corridor North of the James River Freeway

It is recommended that a new diamond interchange be built along US 65 between Republic and Gasconade Roads.

Need: An interchange at that location would be needed to create an Activity Center along US 65 and/or at the quarry. That assertion is supported by a recent study of traffic patterns in the commercial area adjacent to Glenstone Avenue and Republic Road (prepared by George Butler Engineers, Inc.). A new interchange to serve these two opportunities is an important element of these recommendations.

Design and Approval: It is recommended that the proposed diamond interchange north of Republic Road be effectively made a part of the US 60-65 interchange by linking the two with a system of collector-distributor lanes parallel to and outside the US 65 mainline. The purpose of such lanes is to remove weaving maneuvers from the mainline, thus reducing vehicle conflicts.

However, that location would be contrary to the interchange spacing guidelines proposed or being considered by the Missouri Department of Transportation, which would require two-mile separation.

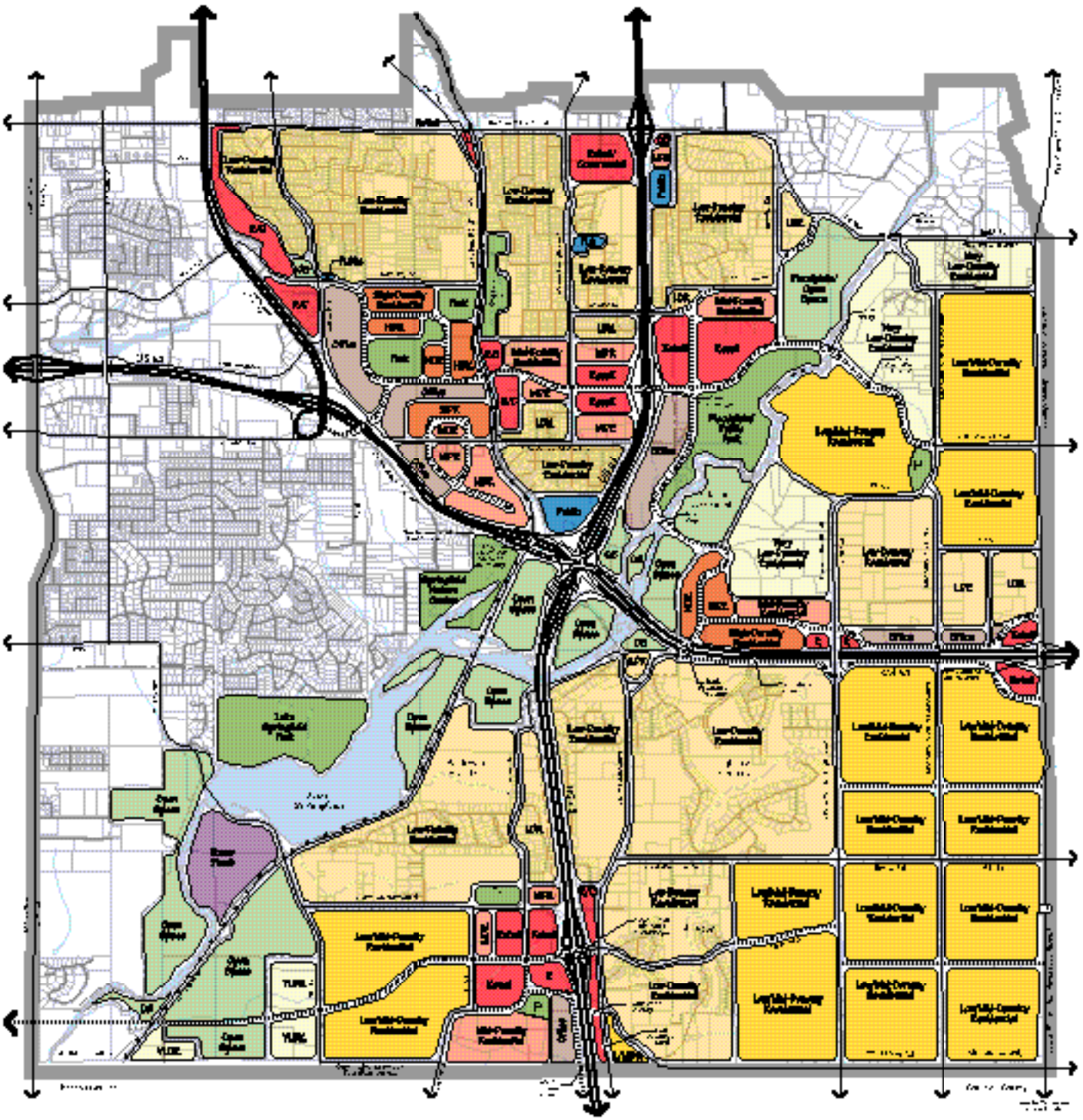
URS engineers prepared a preliminary layout for these two related interchanges. That design indicated that there is sufficient weaving space between the ramps based on the specifications used by the Missouri Department of Transportation and the Federal Highway Administration. That layout is depicted by sketches in Appendix C.

Thus, the City would have to make the case with MoDOT that an exception should be granted to their interchange spacing policy. Support for that request would include the interchange and mainline design recommended by URS Corporation, this report and the *Vision 20/20* Growth Management and Land Use Plan.

Cost: The cost of the proposed interchange north of Republic Road is estimated at $7.66 million and the fully-directional interchange at US 60-65 at $36.0 million (including the collector-distributor roads needed for the “Republic Road” interchange). The details of those estimates are presented in Appendix A.

It is expected that the cost for the new interchange would be borne by benefiting property owners. Some portion of the necessary collector-distributor roads might be covered by MoDOT, but that is not at all certain. A possible funding plan might have the state cover the cost of just a bridge while benefiting property owners

Figure 15
Recommended Road, Bridge and Land Use Patterns



CITY of SPRINGFIELD

Southeast Springfield Development Study

Figure 16

Recommended Road, Bridge and Land Use Patterns

Rationale for the Location: The new interchange component is recommended to be located to the north of Republic Road for three reasons:

1. **Impacts on Republic Road:** The current condition of Republic Road to the west would create difficulty for its expansion from a two-lane collector street to a four-lane arterial. An arterial-sized road would be required for MoDOT's approval of the new interchange.

2. **Link to the West:** The proposed location allows for subsequent development of a new east-west arterial road corridor extending initially from US 65 to Lone Pine Road and ultimately through the quarry to Glenstone Avenue. That alignment would avoid many of the property acquisition and physical constraint issues caused by topography that would be encountered as a part of upgrading Republic Road. The generally open area between the proposed interchange site and Lone Pine Road is not as steeply sloped as the Republic Road alignment.

3. **Cost:** The proposed new diamond component of the redesigned interchange is located to avoid existing residential lots south of Republic Road as well as the existing bridge crossing US 65 at Gasconade Street. A key to a feasible solution is the ability to fit the interchange ramps and the collector-distributor lanes into the existing right-of-way and avoid acquiring developed lots or modifying the bridge at Gasconade Street. Maintaining the bridge at Gasconade is also critical to providing adequate emergency access to the Woodside and Woodbridge neighborhoods that are otherwise only accessible from Battlefield Road.

Alternative to a New Interchange: If the request for a new interchange along US 65 is denied or a funding plan cannot be arranged, there should still be a bridge over US 65 at the indicated site with arterial roads leading east and west. The land use plan in the vicinity would have to be scaled back considerably to something resembling Alternative A (or less intense).

Northwest Quadrant

It is recommended that a new arterial road be built from the proposed interchange along US 65 to Mentor and Lone Pine Roads and eventually through the redeveloped quarry north to Galloway Street and south to Republic Road. This road will be essential to relieve Battlefield Road and the James River Freeway

Northeast Quadrant

River Crossings: Smith, Kinser and a new unnamed road would cross the James River and link to the existing network above the bluff. The cost of the Kinser Road bridge over the James River is estimated at $4,600,000.

The alternatives showed the new arterial road climbing the river bluff through a ravine south of the undeveloped wooded knob on the east side of the river. However, based on citizen comments, it appears that this connection should be made on the north side of that wooded area by following an existing utility corridor and creek bed up the hill to the east from the James River valley. This alignment avoids some potential effects on existing homes that would otherwise be affected by the earlier, southerly alignment. That alignment may also avoid some environmental impact by following the existing utility corridor out of the river valley.

Battlefield to County Highway J Connection: Arterial road extensions east of from US 65 are complemented by improvements to Battlefield Road in order to protect its function as a major link from US 65 to County Highway J. The easterly extension of Battlefield Road from US 65 to Highway J is proposed with improvements to Farm Road 164 and Smith Road that would provide better continuity and greater traffic capacity.

In addition to widening the roadway, improvements for better continuity are proposed at:

- Battlefield and Murphy Road
- Murphy Road and Farm Road 164
- The Farm Road 164 intersection with Smith Road at the east end of the bridge crossing the James River.

In each case, the necessary improvement would essentially be the reorientation of a "T" intersection to make the east-west movement the dominant direction of travel through the intersection.

US 60 Corridor East of the James River

An interchange with US 60 is recommended at Highway J / NN, which would exceed MoDOT's preferred two-mile spacing guideline. There would be a bridge over the future limited access freeway at Scotland Road ($600,000) and another to the west near Farm Road 181 ($600,000). Frontage roads on both sides of the highway would link the bridges and provide access to development ($2,100,000). (Refer to Appendix A for interchange, bridge and frontage road estimates.)

Collinson Road would not cross US 60. Highland Springs residents could access the highway system at either Highway J / NN or Evans Road.

To promote mid- and high-density development north of US 60 near the James River valley, Farm Road 181 is recommended to be extended over US 60, across the river valley and back to US 65 at the proposed interchange there.

Glenstone Road at the James River Freeway

The interchange of Glenstone Road and the James River Freeway is planned to be upgraded based the recommendations of a previous study. It is presently a diamond interchange and would be changed to the combination diamond and loop design. That change would make it much easier for traffic that is southbound on Glenstone Avenue to go east on the James River Freeway. It would also make it much easier for traffic that is eastbound on either the freeway or Republic Road to access Republic Road east of the freeway.

The *Southeast Springfield Development Study* proposes that eventually the Republic Road bridge over the freeway be rebuilt so that the connection is to the planned road through the quarry that links between Galloway Street and US 65.

Railroad Crossing of the James River Freeway

US 60, the James River Freeway, would be elevated over the at-grade railroad track as part of the reconstruction of the interchange of US 60 and 65. The estimated cost of this bridge is $1,020,000.

Evans Road Interchange

Increased traffic can be expected at the Evans Road interchange with US 65 if land development occurs as recommended in this report. The factor that limits development will be the capacity of the interchange rather than land area available for development.

Because this area occurs at the southerly extreme of developed Springfield and Greene County, most of the travel generated by an Activity Center would be expected to be oriented to and from the north. Parts of developed Springfield generally to the north of the Evans Road area would be expected to attract or generate more trips than the emerging development to the south in Christian County.

For this reason, capacity of the interchange will largely be controlled by the ability to provide for movement from eastbound Evans Road to northbound US 65 which is limited by the need for left turns to complete this movement. Interchange improvements will be required to provide capacity for this critical movement. Those improvements may be staged as needed to accommodate growth, starting with bridge widening for the addition of left turn lanes on eastbound Evans Road. They could culminate in a totally revamped interchange with a single-point diamond configuration or a hybrid design with a partial cloverleaf design to accommodate the dominant movements.

A detailed study of the Evans Road interchange was conducted by URS Corporation as part of the *Southeast Springfield Development Study* and its conclusions are summarized below. That traffic study was based on the recommended land use and road network patterns illustrated by Figure 15 on page 43. A sequence of land development was assumed. A full description of the assumptions and methodology for that interchange study was presented in a memorandum from URS to the City of Springfield dated 19 March 2002.

Conclusions of the Evans Road Interchange Study:

Table B-1 summarizes the Level of Service (LOS) for Evans Road under the various development scenarios. (Tables B-1 through B-4 can be found in Appendix B of this report.)

No-Build Scenario. With no infrastructure improvements (No-Build Scenario), Evans Road would perform at LOS D or better until the completion of Stage 3 development for both the current and horizon years when it degrades to E. Significant volumes are generated in Stages 4 and 5, and Evans Road would degrade into LOS (F and worse) breakdown conditions at this point.

Build Scenario. For the Build Scenario (meaning improvements to US 65 and a new arterial road between US 65 and National Avenue), Evans Road would perform at LOS C or better for all stages of development. The East-West Arterial would perform at LOS D or better for all stages of development, and will be at LOS C or better until completion of Stage 5 in the horizon year.

Forecast Conditions: The US 65 - Evans Road interchange was studied for the PM peak hour to give an indication of delay under current and future assumed development. The two conditions assumed for the Build Scenario are:

1. The planned US 65 capacity expansion (additional lanes)
2. The planned east-west arterial road linking US 65 to National Avenue and continuing west to the planned extension of Kansas Expressway.

The following conditions were forecast:

Southbound Ramp. The southbound ramp would be over-capacity and enduring breakdown conditions with 2020 Build and full development conditions (Table B-3).

Signalization. Signalization of the interchange would improve operation to an acceptable Level of Service under existing conditions. This would be a short- to mid-term solution, with LOS degrading further under various development scenarios, as shown in Table 6.

2002 No-Build Scenario. At 2002 volumes (and No-Build infrastructure), the interchange would operate at LOS B until Stage 3 development is complete, when it would operate at LOS E, degrading to F with further development.

2020 No-Build Scenario. In 2020 (No-Build Scenario), the interchange would operate at LOS B until completion of Stage 3 development when it would be at LOS F.

2002 Build Scenario. In 2002, with the Build Scenario, the interchange would be at LOS E with Stage 1 and 2 development, and F with Stage 3 development.

2020 Build Scenario. In 2020, with the Build Scenario, the interchange would be at LOS F under existing development.

Mitigation Measures: Several mitigation measures were analyzed:

1. Signalization of the current diamond interchange

2. Additional left-turn lanes
3. Construction of a partial cloverleaf interchange with a loop in the southeast quadrant
4. Construction of a single-point interchange.

The effects of these mitigation measures are summarized in Table B-3. In 2020, with full 'build' infrastructure and development build-out, the partial cloverleaf is estimated to be LOS C, and the double lefts and single point will be LOS D.

Cost Estimates: Table B-4 summarizes approximate cost estimates for these design options.

Traffic Signals. As a short- to medium-term solution, signals could be installed for about **$320,000.**

Double Left-Turn Lanes. In the longer term, reconstruction of the interchange to widen the Evans Road overpass and include signals and double left-turn lanes northbound would be about **$3,534,000.**

Partial Cloverleaf Reconstruction. Reconstruction of the Evans Road bridge as partial cloverleaf with a loop in the southeast quadrant would be about **$4,028,400.**

Single-Point Diamond Interchange. A single point diamond would cost about **$7,520,000.**

Southeast Quadrant

Mentor Road should be the east-west arterial road in the southeast quadrant rather than Millwood Drive. The traffic carrying function Millwood has been compromised by its curves, hills and numerous access points. New collector roads between Scotland and Highway NN would also be useful.

Southwest Quadrant

Arterial road connections in and out of the southwestern quadrant area are difficult because of development near US 65, the James River and the railroad line serving the power plant.

To provide east-west movement through this quadrant, it is recommended that the northerly alternative be chosen from the two alternatives being studied by Springfield and Greene County for East-West Arterial, a link from US 65 to National Avenue and eventually to the future extension of Kansas Expressway. This alignment would work well with the proposed residential and commercial land uses and would have fewer negative effects on existing houses and the floodplain than would the southerly alternative. This road would replace the existing Evans Road link to US 65.

Evans Road would be unmodified at its west end where it intersects Kissick Avenue and continues west across the river at the power plant and Lake Springfield. At its east end, the current connection of Evans Road to the interchange would be replaced by a southerly extension of Southwood Road to the proposed East-West Arterial. Freemont Avenue would provide a connection south into Christian County, and a second connection to the east under US 65 would continue to be provided near the river at Overlook Road and Timbercrest Road.

North-South Arterial along the Eastern Perimeter

County Highway J / NN would remain the Major Arterial along the eastern edge of the Study Area. This road would provide continuous north-south movement east of US 65 all the way from I-44 into Christian County. It will be essential for the City and the County to restrict driveway access and try to separate street intersections by at least one-quarter mile in order to protect the traffic capacity and safety of this important road.

Utilities

Sewer and water utility service should not be a major constraint to achieving the land development pattern illustrated by Figure 15.

Sanitary Sewer Service

The major lines (called interceptors) for the sanitary sewer system are already installed along the James River (to Smith Road) and Farmer's Branch Creek (to the Highland Springs neighborhood).

Land owners who wish to access those lines and develop their property to City densities, can petition the City for annexation and go through the normal subdivision approval and construction process.

Water Service

As with the sanitary sewer system, trunk water lines exist in all four quadrants of the Study Area. The City's comprehensive water study has assumed the eventual urban development of the Study Area, and the trunk lines were sized accordingly.

Annexation is not needed to receive water service from the Board of City Utilities, as it is with sanitary sewer service from the City.

Land Use

The recommended land use pattern guides most of the retail, office and multiple-family housing development west of the James River, although two locations on the east side of the river are designated for business and higher density housing. The rest of the undeveloped land is recommended for low and mid-density housing. As noted previously, several large locations are occupied by semi-rural lots or golf course subdivisions. The land use pattern shown by Figure 15 includes the following categories:

Table 1
Recommended Land Use Categories and Zoning

Land Use Category	Description	Appropriate City Zoning *
Very Low Density Residential	Fewer than 1 house per acre	R-SF Single-Family District
Low-Density Residential	1 to 4 housing units per gross acre. May include some attached housing such as townhouses.	R-SF Single-Family District
Low- / Mid-Density Residential	3 to 8 housing units per gross acre. May include attached housing such as townhouses or buildings with 4, 6 or 8 units and individual outdoor entrances.	R-SF Single-Family District R-TH Townhouse District
Mid-Density Residential	5 to 12 housing units per gross acre. Includes detached or attached housing but not apartment buildings.	R-SF Single-Family District R-TH R-MD Medium-Density Multi-Family District
High-Density Residential	More than 12 housing units per gross acre. Includes all forms of housing.	R-HD High-Density Multi-Family District
Office	Office buildings as a primary land use	O Office District
Retail or Service Business	Includes offices	LB Limited Business District GR General Retail District HC Highway Commercial District
Parks		None
Open space	River floodplains and the Springfield Nature Center	Floodplain Conservancy
Public, School or Cemetery		Conditional Use
Power Plant	The City Utilities electric generating plant.	HM Heavy Manufacturing District

· Use of the Springfield Planned Development District is encouraged in order to promote design creativity.

Estimated Future Development

Table 2 presents the approximate acreage of undeveloped land by land use category on the land use pattern depicted by Figure 16 along with an estimate of the number of housing units and the non-residential floor area.

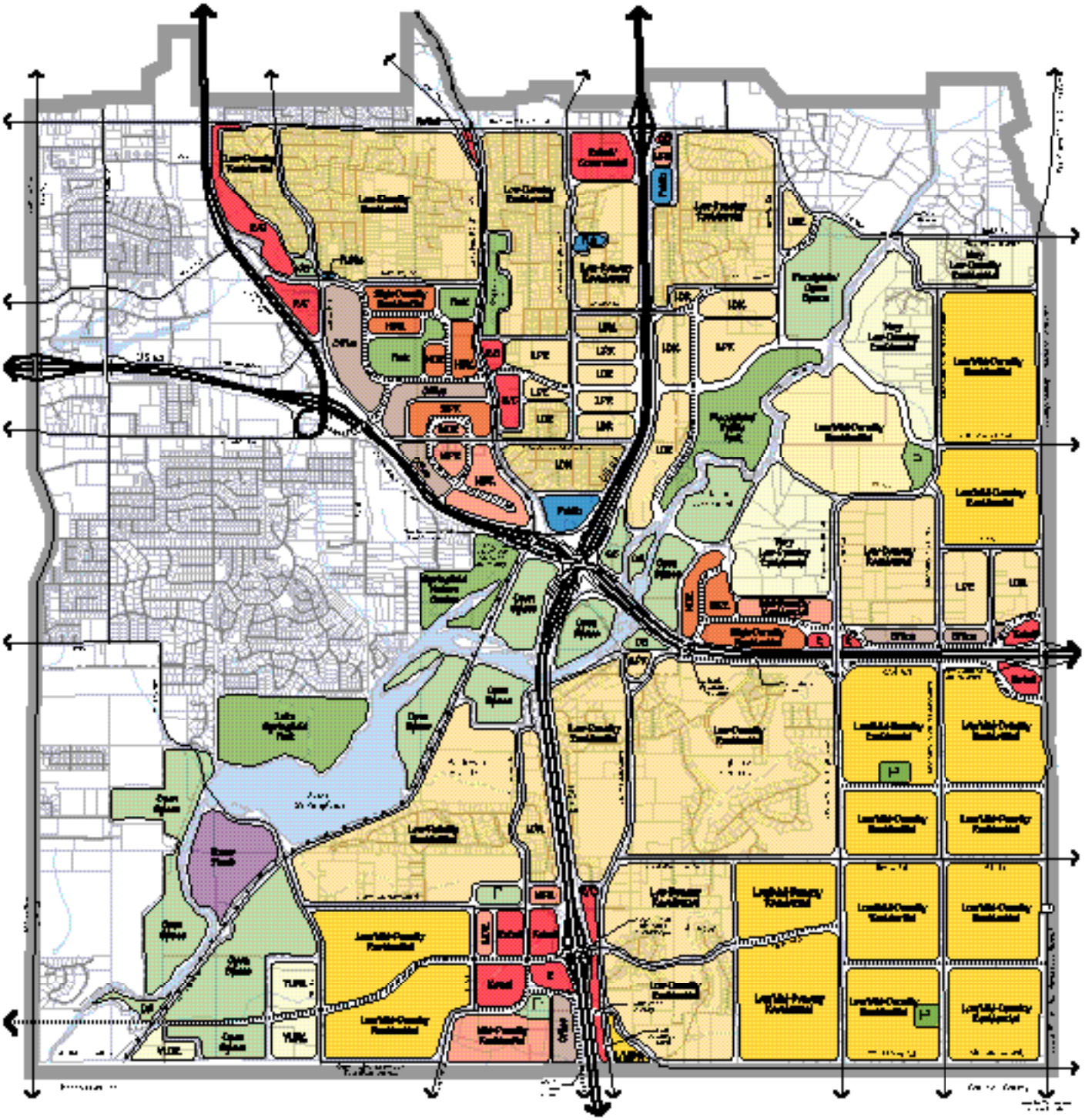
Table 2
Acreage and Development by Land Use Category in the Recommended Land Use Pattern
(Undeveloped Land Only)

Land Use Category	Undeveloped Acreage in the Study Area	Estimated Number of Housing Units	Estimated Commercial Square Footage
Low-Density Residential	151	283	
Low- / Mid-Density Residential	1,865	5,595	
Mid-Density Residential	265	1,590	
High-Density	152	1,596	
Office	145		1,263,000
Retail or Service Business	261		1,705,000
Parks	110		
Public Open Space	1,147		
Total	4,096	9,064	2,968,000

Land Use Pattern without a New Interchange on US 65

The land use pattern that would be recommended if a new bridge is not constructed over US 65 north of Republic Road is illustrated by Figure 17. That access change would mandate significantly lower land use density on sides of US 65 in that vicinity.

It is felt that a significant degree of multiple-use investment could still occur on the retired quarry site but that development would be less intensive without a US 65 interchange than with one. Without a new US 65 interchange, other access roads such as Galloway, Republic, Luster and Lone Pine would probably require improvement.



CITY of SPRINGFIELD

Southeast Springfield Development Study

Figure 16

Recommended
Road, Bridge and Land Use
Patterns without a
New Bridge over US 35

Policy and Ordinance Amendments

It is recommended that Springfield and Greene County amend the Growth Management and Land Use Plan of *Vision 20/20* as follows:

1. **Maximum Density in the County Portion of the Urban Service Area and in the Urban Reserve:** Reduce the allowable housing density to 2 houses per 40 acres from the present 4 houses per 40 acres. The minimum lot size should remain at 3 acres or sufficient size to meet County septic system and well requirements.

2. **Density Bonus for Sketch Plats:** In the County portion of the Urban Service Area and in the Urban Reserve allow up to 4 houses per 40 acres (rather than 2 per 40) if a sketch plat is submitted and approved showing how the tract may be resubdivided in the future to City-sized lots when sewer becomes available and the area is annexed into the City of Springfield.

The appropriate locations in the Springfield *Vision 20/20* Growth Management and Land Use Plan for these changes would be the section on the Urban Service Area (page 18-15) and the section on the Urban Reserve, Objective 5, Action 1 (page 18-21).

Greene County should adjust its zoning ordinance and map consistent with these policy changes. The predominant current County zoning in the Study Area allows five-acre lots.

This study has highlighted the obstacles to efficient and economic metropolitan growth that are caused by a ring of semi-rural lots three to ten acres in size around a city. If the public is to make the expensive improvements in roads, bridges, utilities and parks recommended in this plan, it owes it to itself to ensure that its land use regulations are supportive of rather than in opposition to those investments. Otherwise, there are substantial and long-term costs to all members of the public in terms of taxes, travel time, impaired water and air quality, and urban quality. Ultimately, the economic competitiveness and quality of life of the region are harmed.

Northwest Quadrant

There is great potential to create an urban Activity Center in the triangle formed by the James River Freeway, US 65 and Galloway Street. This location will have good access if the interchange proposed for US 65 is built and the proper modifications are made to the Glenstone interchange. Figure 15 illustrates one possible pattern of mid- and high-density housing, retail locations, offices and parks.

The quarry has long-term development potential. By the time the mining is completed, urban development will have moved far beyond this location, making the quarry a relatively convenient location. Its size and accessibility will offer several possibilities for mixed- and multiple-use development, including a park with a water feature (since the site is so low).

If the US 65 interchange is not approved, the development intensity will have to be replanned and scaled back to reflect the greatly decreased access.

Northeast Quadrant

With a new interchange, retail, office and high-density residential land uses would be feasible east of US 65 above the river floodplain. East of the river, at least half the land is expected to remain semi-rural although there are possibilities for urban neighborhoods served by City sewer and water lines. A site for a neighborhood park of about 10 to 15 acres would should be acquired by the City.

Highway 60 Corridor

Along the north side of US 60, retail and office development would be possible closest to the interchange at County Highway J with multiple-family housing closer to the river bluff. This band of urban development will be confined by the large lots to the north.

The south side of the US 60 corridor would be guided for low and medium density housing. That reflects the presence of the Highland Springs golf neighborhood and the potential for slightly denser housing served by sewer and water to the east (up to 8 units per gross acre).

Southwest Quadrant

Most of this quadrant is guided for housing up to 4 units per gross acre, consistent with the existing pattern and recent proposals. Near the US 65 interchange, retail businesses, offices and mid-density housing would be allowed. A new neighborhood park is also needed.

Southeast Quadrant

This quadrant is guided almost entirely for low-density and low / mid density housing up to 8 units per gross acre. Some business space is shown near US 65 and also near County Highway NN. One or two neighborhood park sites should be acquired by the City to serve the future residents here.

The James River Valley

The floodplain of the James River will be protected either privately through the Floodplain zoning district and/or publicly as a park and greenway. It is the City's intention to create a linear park (called a greenway) in this valley that includes open space, pedestrian paths and bicycling paths. For a further description of this and other Springfield and Greene County greenways, refer to the Parks, Greenway and Open Space Plan of *Vision 20/20*.

Priority of Public Improvements

The general priority for the major pubic infrastructure improvements in the Study Area is presented below along with the factors that were considered in preparing the ranking and comments on each project.

These factors considered, and in this order of importance:

1. **Market:** Would the public improvement be closely supportive of private development projects that are ready to proceed?

2. **Functional Relationship to other Projects:** Would the public improvement be necessary to support another key proposal? (Example: a new arterial road serving a new highway interchange.)

3. **Support for Land Development:** Would the public improvement provide the access or services necessary to open large tracts of land for urban development?

4. **Environmental Quality:** Would the public improvement enhance environmental quality or quality of neighborhood development?

5. **Consistency with** Vision 20/20**:** Was the public improvement recommended by *Vision 20/20* ?

6. **Feasibility:** To what degree would the public improvement be feasible in financial, regulatory or physical terms?

Table 3
Priority of Public Improvements

Priority (1 – 5)	Improvement	Type *	Comments
1	**Glenstone Interchange:** Improve the interchange of Glenstone Avenue and US 60 (James River Freeway)	I	A previously programmed improvement for a high-volume interchange.
1	**Evans Road:** Signalize the Evans Road interchange	I	Necessary to maintain adequate level of service as land development proceeds, especially land development west of the interchange.
1	**Evans Road:** Widen and add double left-turn lanes to the Evans Road interchange	I	Probably more cost-effective than rebuilding the interchange to a partial cloverleaf or a single-point diamond design.
1	**East-West Arterial:** Build the East-West Arterial between US 65 and Kissick Avenue	R	Necessary to support land development west of the Evans Road interchange. Should include landscaping, sidewalks and bicycle lanes.
2	**East-West Arterial:** Extend the East-West Arterial between Kissick and National Avenues.	R	Needed to support development along the southern tier of the community. (Include generous landscaping, sidewalks and bicycle lanes or paths.)
2	**US 60-65 Interchange:** Improve the interchange of US 60-65 including the grade-separation of the railroad line.	I	Probably needed to accommodate growing volume in this interchange. Being studied in 2002 by MoDOT. Design, approvals, funding and construction will take 10+ years.
2	**Parks:** Acquire land for neighborhood parks.	P	Essential for quality of life in the neighborhoods.

3	**US 60 East of US 65:** Improve US 60 east of US 65 to freeway standards and construct a new bridge at Scotland Road, a new interchange at Highway J-NN (include enhanced bridge facades).	R B I	Will be needed in the mid-term future for safety and capacity.
3	**US 65:** Build new **bridge** over US 65 north of Republic Road with new road connection to Lone Pine Road (dubbed Kinser Road Extended).	B R	Essential for the east-west arterial road that will be needed to relieve US 60 of short trips.
3	**Galloway Creek:** Build regional detention ponds and other surface water management devices in the Galloway Creek watershed.	W	Needed to alleviate current flooding problems, which would otherwise worsen with land development.
3	**Galloway Creek Greenway:** Complete the Galloway Creek Greenway.	P	Completion of an improvement started previously. Will serve a rapidly growing area. Coordinate with land redevelopment associated with the proposed arterial road connection (Kinser Road Extended).

4	**US 65:** Build **interchange** along US 65 north of Evans Road with new road connections to Lone Pine Road and to Kinser Road (along with a James River bridge).	I R	An interchange would greatly enhance land development potential both east and west of US 65. Would be very helpful to the intensive development of the quarry site in the long-term future.
4	**James River Greenway:** Acquire James River floodplain lands for public parks and build Greenway paths.	P	A major element of Vision 20/20.
4	**James River Bridge:** Rebuild the James River bridge at Smith Road (FR 164).	B	A mid-term project to address an aging and under-sized bridge. Provides a link to Battlefield Road from the Highway J.
4	**Farmer's Branch Creek:** Build regional detention ponds and other surface water management devices in the Farmer's Branch Creek watershed.	W	Needed to manage the quantity and quality of runoff.

4	**Access Road:** Build a road between El Dorado Street and Kinser Road Extended.		Would provide access to retail development.
4	**El Dorado Street:** Improve the road connection between Gasconade and El Dorado Streets.	R	A minor improvement for traffic flow.

5	**US 60 at FR 181:** Construct a new bridge over the US 60 freeway at FR 181 with a new road and river bridge leading to Kinser Road Extended.	B R	May be needed to minimize the barrier created by upgrading US 60 to freeway standards.
5	**Quarry Roads:** Build a road link through the retired Conco quarry from Lone Pine Road to Galloway Street	R	Needed to support a major mixed-use development on the retired quarry site. Would complete the arterial link started with the creation of a new interchange along US 65.
5	**Republic Road Access:** Connect the Glenstone interchange to Republic Road with an overpass.	B	Would improve access to and from the quarry
5	**Collector Roads:** Build two east-west collector roads between Scotland Road and Highway NN	R	Needed to support land development in the vicinity.
5	**Landscaping:** Upgrade Scotland and/or Collinson Roads with landscaping, sidewalks and bicycle paths or lanes.	R P	Would help support quality of life and lasting value in nearby neighborhoods.
5	**Sewers:** Extend the Farmer's Branch Highland Springs sewer main.	U	Essential for continued land development in the vicinity but not needed immediately.

- **Types of Improvements:**

R	**=**	**Road**	**U**	**=**	**Utility**
B	**=**	**Bridge**	**P**	**=**	**Park**
I	**=**	**Interchange**	**W**	**=**	**Surface Water**

Urban Design Guidelines

This chapter describes guidelines for the design of:

1. Residential neighborhoods
2. Commercial districts
3. Office or industrial districts
4. Mixed-use districts
5. Bridges
6. Arterial roads
7. Indigenous materials
8. River bluffs

Residential Neighborhood Design Guidelines

The following guidelines will be used by City staff and officials to guide developers in their design process and to review their applications, in conjunction with the Springfield Zoning Ordinance. Some of these guidelines may be best achieved through the use of the planned-unit development feature of the Zoning Ordinance.

Housing Variety

Work with developers to achieve in each major neighborhood a range of housing types including single-family detached, townhouses and apartments. Some portion of each type of housing should, ideally, be available for occupancy on either an ownership or lease basis. Refer also to the guidelines on multiple-family housing below.

- Encourage a range of densities, housing types and building configurations; and discourage large housing projects that consist of a single building type.

- When combining housing types, it is preferable for the transition between types to occur at the rear rather than the front (i.e. across a courtyard or parking area rather than across the street).

Street System

Connections: Local streets (either residential, commercial or industrial) should be interconnected to the extent possible. Cul-de-sacs should be used only to access small areas that could not otherwise be served without environmental impact or loss of parcels.

Street Edges: It is essential to the long-term quality of the residential neighborhoods that the street corridor be more than simply a conduit for automobiles. The street corridor improvements should provide an attractive green frontage for the houses, provide shade and enclosure for the street, calm the traffic speeds and provide safe places for people of all ages to walk and for children to play.

Thus, local residential streets should be designed to the standards of the City of Springfield, which include:

Pavement Width:	26 feet
Right-of-Way Width:	50 feet
Sidewalks:	One or both sides, depending on the housing density
Trees:	Both sides of the street, three feet behind the curb

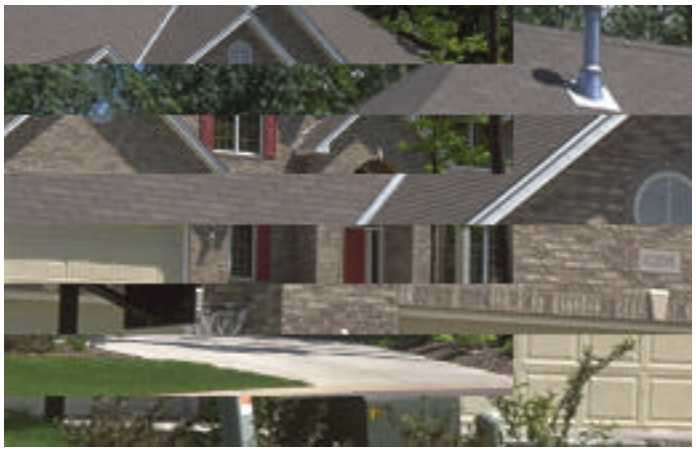
Cul-de-Sacs: When cul-de-sacs are used, they each should include a landscaped island.

Garage Setbacks

The City should encourage but not require that garages be set back from the front facade line of the house. Garages on corner lots should be rotated so they face the side street, if possible. Detached garages in the rear yard are acceptable.

Porches and Similar Elements

Transitional architectural features should be strongly encouraged on the front of every residential building. These include porches, covered stoops, balconies and bay windows.



Housing Variety: Plan for and encourage through zoning a variety of housing types, densities and costs in each major neighborhood.

Multi-Family Attached Housing Design Guidelines

Attached housing should be created as an attractive, essential and acceptable alternative to single-family detached housing. The following design guidelines should be observed by designers:

- Encourage the use of a **single-family housing design vocabulary** in multifamily and attached buildings, as expressed by pitched roofs, articulated facades, visible entrances, porches or balconies, and a maximum height of three to four stories. Taller buildings may be suitable for senior citizens housing, but not as a rule for family housing.

- Attached housing should be built in **small groupings** so that it fits into the overall residential context rather than being sequestered into large project sites. No more than approximately 75 units of any type of attached housing should be built in a single area.

- **Apartment buildings should emulate single-family housing** in their basic architectural elements -- pitched roofs, articulated facade, identifiable front door and orientation to the local public street. Balconies overlooking the public street are highly encouraged. When garages cannot be located to the rear or on the interior of the block, they should be set back similar to the requirements for single-family housing. Ensure that **buildings fit into the neighborhood** through the use of compatible scale, roof pitch, building massing and materials.

- Encourage **unity as well as diversity** by specifying a common design vocabulary among the buildings, a clear pathway system and shared outdoor space that unifies and integrates the site of the attached housing.

- Design the **front and back facades** with appropriate levels of formality. The front, as the more public side of the house, should receive the more formal treatment, with trash and recycling storage, play equipment and outdoor storage located in the back. The main entry should face the street.

- Buildings should address the street with **varied and articulated facades**, frequent entries and windows. Porches and balconies should be encouraged, and facades consisting of long blank walls or series of garage doors should be prohibited.

- If a multifamily building or attached housing is developed near single-family detached housing, ensure that the **width of the building facade facing the street** is similar to that of a single-family house. Attached units should be grouped in rows of no more than four or six units to avoid a monolithic appearance.

Street System: Build relatively narrow interconnected neighborhood streets with sidewalks and trees.

Housing Transition to the Street: Encourage front porches and set back or turned garages.

- **Duplexes** should be designed for visual compatibility with single-family housing, should be scattered among the neighborhood rather than concentrated, and may be used as a transitional building type near larger buildings and street intersections.

- **Driveways and garages** should be located to the rear of the lot or interior of the block. **Porches and front steps** should face the local street.

- **Improve security** by creating visual indications of the boundaries between private space, public space and shared space.

  -- Provide each housing unit with clearly defined private or semi-private outdoor space such as a **yard, patio, porch or balcony,** with direct access from inside the unit. Clearly define the boundaries of private outdoor space with elements such as fencing, sidewalks and vegetation.

  -- Use semi-private outdoor spaces such as **porches and patios** to increase the sense of privacy and security within the home. Provide opportunities for surveillance of shared outdoor areas such as streets, sidewalks and play areas from within the home.

Multiple-Family Housing: Follow design guidelines for better multiple-family housing.

Commercial District Design Guidelines

The following guidelines will be used by City staff and officials to guide developers of retail and service business properties in their design process and to review their applications.

Transition to Residential Areas

Any single-family neighborhoods that abut commercial development should be protected or screened from adverse visual impacts. Building heights and massing should be kept low or reduced adjacent to single-family housing. Except for intentionally mixed-use developments, landscaping, berming and/or fencing should separate commercial and residential activities.

Building Height. Commercial building heights within 100 feet of existing or proposed detached housing or townhouses should not exceed 2 stories or 24 feet.

Building Walls. All sides of a building visible to the public, whether viewed from a nearby property or a roadway, should display a similar level of quality and architectural finish. This should be accomplished by integrating architectural variations and treatments such as windows and other decorative features into all sides of buildings.

Building walls along public streets should not be blank. All walls facing streets or walkways should include windows, doors, openings or other treatments that help mitigate the unfriendly appearance of blank walls and improve the environment for motorists and pedestrians.

One or more of the following design techniques should be used:

-- Changes in color, texture or material
-- Projections, recesses and reveals expressing structural bays, entrance or other aspects of the architecture with a minimum change of plane of 12 inches
-- Groupings of windows or fenestration
-- Arcades and pergolas
-- Display windows.

Roofs. Roofs should be peaked, sloped, gabled or shed-style to add visual variety and compatibility with nearby housing.

Retail Sites: Design attractive commercial sites that harmonize with residential areas, reduce the visual impact of parking and nicely accommodate the pedestrian and the bicyclist.

Building Materials and Colors. The exterior appearance of commercial buildings should harmonize with nearby residential areas.

-- Smooth-faced concrete block and tilt-up concrete panels should not be used.
-- Metal should not be used as a primary exterior surface material. It may be used as a trim material covering no more than 10 percent of the façade or as a roof material.
-- Façade colors should be earth tones with a low reflectance. High-intensity, metallic, black or fluorescent colors are prohibited.
-- High-intensity, primary, metallic or fluorescent colors should not be used on any roof area visible from a residential area, public or private right-of-way or public open space.

Lighting. Lighting from commercial developments should be carefully designed and strictly regulated. Lighting from commercial developments shall be designed so that it does not directly shine off the site, either onto public streets or onto residential areas. All developments should meet or exceed the requirements of Section 6-1400 of the Springfield zoning ordinance.

In particular, lighting from gasoline station canopies shall be recessed and/or shaded so that the luminaire cannot be seen from off the site and light cannot shine directly off the site.

Block Pattern. Commercial sites should be composed of a series of neighborhood-scale "blocks" of development with an average length of 400 feet. Blocks will be defined by driveways and pedestrian or bicyclist paths.

Landscaping and Screening

Every new commercial development shall be landscaped and screened consistent with the requirements of Sections 6-1000, Screening and Fencing, and 6-1200, Landscaping and Bufferyards, of the Springfield Zoning Ordinance.

Parking

The design of parking areas should be regulated according to Section 6-1301 of the Springfield Park Zoning Ordinance. The following guidelines are supplementary.

- **Large parking lots** should be divided into bays by raised islands landscaped with trees. Parking areas should be broken into individual lots not to exceed 200 cars. These sections should be separated by major landscaped buffers to provide visual relief.

- In parking lots, **landscaped islands** should be provided at maximum intervals of every twenty parking spaces and at the ends of all rows of parking. Parking islands should have a minimum width of 8 feet. A continuous poured-in-place concrete curb should be provided around parking islands to prevent vehicular intrusion. Parking islands may not be used to satisfy the open space requirement except where islands are greater than 500 square feet in size. Additional landscaping is to be provided within parking lots in accordance with the requirements of the "Landscape" section of this chapter.

- **Parking directly adjacent to** buildings should be avoided wherever possible. A minimum setback of 15 feet should be reserved for pedestrian circulation and landscaping between

building and parking areas except for drop-off and loading zones. This distance may be reduced to 10 feet in the industrial areas and may not require landscaping depending upon its proximity to streets and common open space.

- **Driveways should be consolidated** to minimize external street congestion.

- Landscaping layout and design should clearly **define and direct pedestrian movement** through parking areas.

- All **parking should be screened from public streets** by appropriate landscaping.

- Where **parking structures** are used, the architectural design and use of materials should be similar or compatible with the architecture of adjacent buildings. Screening at the perimeter of the structure should be provided so that automobiles are screened up to a height of three feet six inches above the first floor level. Above-grade structure parking should incorporate planter boxes on all deck perimeters facing public street frontages or pedestrian circulation/plaza areas. No parking structures should be located within a front yard.

Pedestrians

Pedestrians should be able to move with comfort and security between the public sidewalks and private developments and among buildings on the same site. As much as possible, pedestrian walkways should be provided directly between adjoining developments. If long blocks are used, mid-block pedestrian and bicyclist access between the residential neighborhood and the commercial development should be provided.

Pedestrian routes from the street to the building entrances and through each site should be clearly defined using building massing and architecture, sidewalks, landscaping and lighting. Awnings and arcades over windows and doors should be employed to protect pedestrians from the elements.

Bicycles

Each development should include a bicycle rack, and sidewalk ramps should be installed at curbs for both bicyclists and the disabled.

Outdoor Dining and Seating

Developers should be encouraged to include sidewalk cafes or outdoor eating for restaurants, as well as outdoor seating.

Signs

Signs should be controlled according to Section 5-1400, Signs, and Section 5-1410, Scenic Corridor Overlay District, of the Springfield Zoning Ordinance. The following guidelines are supplementary.

Freestanding signs should have a limited number of names and/or logotypes (a maximum of three). They should be designed to appear as a single sign from a distance through the use of a framework of materials consistent with the building facade.

Wall signs should not be white backlit plastic; individual letters are preferred; colored plastic panels with white or colored letters may also be acceptable. No bulletin signs (either portable or permanent) should be allowed.

Gasoline station canopy-face signs should not be allowed.

Buildings as signs. Commercial buildings shall not be allowed to be designed as signs through the use of colors or patterns that are particular to the public communication system of the company or franchise. Buildings should be designed for re-use by other businesses without substantial renovations to their exterior appearances. This guideline is intended to create buildings that are compatible with the generally residential nature of the community and which are modest in their outward appearance.

Mixed-Use

The City will support through zoning, site plan reviews and shared parking the creation of mixed-use developments that include housing or offices above shops.

Corner Sites

On major corner sites, it would be beneficial to locate a building near the street intersection. The City's requirements for a clear vision zone along the right-of-way lines of both intersecting streets must be maintained, however.

Office, Industrial and Business Park Design Guidelines

The following guidelines are intended to promote appealing office, industrial and business park development in Southeast Springfield. While consistency is critical in order to attract and retain the best corporate "citizens," these standards also permit design flexibility in order to address individual company needs.

Precedence is given to any provisions of the Springfield Zoning Ordinance that are found to overlap these guidelines.

In general, the development of industrial and office sites should be planned to provide pleasant and safe environments for employees and visitors. Multiple building projects should cluster building entries. Parking lots should be located for ease of access while minimizing their visual dominance. Care should be taken to avoid a rigid strip-like arrangement of site elements in order to promote spatial diversity along street corridors. Sidewalks and paths should be provided to help encourage pedestrian activity and to link the pedestrians to various activities and facilities.

The Office, Industrial and Business Park section addresses:

- Building Location
- Vehicular Access and Parking

- Pedestrian Access
- Service, Loading and Storage Areas
- Fencing and Walls
- Utilities
- Lighting
- Landscaping
- Maintenance
- Signage

Building Location

- All structures and buildings should provide a clear view of the **public entry** from adjacent public rights-of-way.

- Each principal building on a site should have a highly **visible entry** featuring no fewer than two of the following: canopies, overhangs, arcades, raised corniced parapets over the door, peaked roof forms, arches, outdoor patios, display windows, architectural details or integral planters.

- **Driveway setbacks** from adjacent property lines, other than along street frontages, should be a minimum of 10 feet, except where access driveways are shared by adjacent property owners.

- No **landscape setback** is required between warehouse and industrial uses provided this abutment is not common open space.

- All **setbacks should be planted** in accordance with the landscape setback treatments described in these guidelines.

Landscaping

Landscaping should be regulated according to Section 6-1200 of the Springfield Zoning Ordinance.

Parking

The design of parking areas should be regulated according to Section 6-1301 of the Springfield Zoning Ordinance. Refer also to the supplementary parking design guidelines in the Commercial District section of this chapter.

Pedestrian Circulation

- Direct, **continuous sidewalks** should be built across all large parking areas.

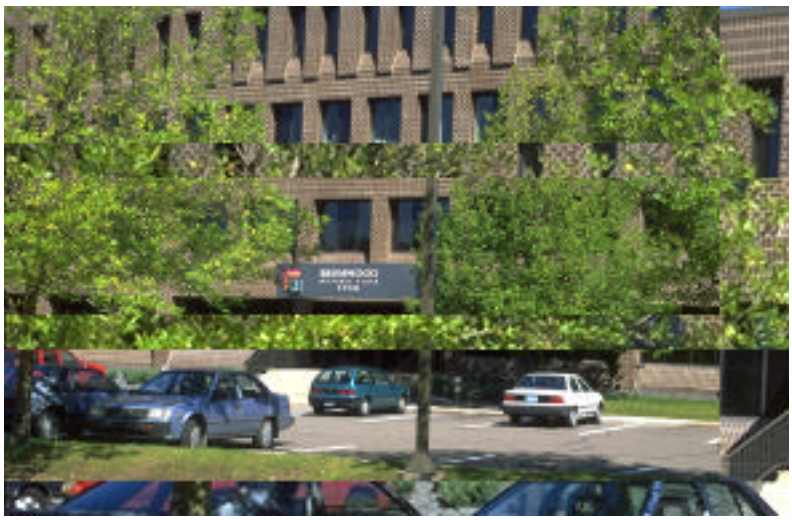
- Internal **pedestrian plazas** should be used to create "place" and tie uses together.

- **Building entries** should be oriented toward plazas and walkways, not parking lots.

- **Bicycle locking racks** should be provided in visible and secure locations.

- Sidewalks adjacent to any buildings containing **retail uses**, should be 8 feet wide.

- **All other sidewalks** should have an unobstructed width of 5 feet where pedestrian movement is anticipated and should be handicapped accessible. The connection of the five-foot pedestrian path to the adjacent public sidewalks is encouraged.



Office Development: Promote office development that includes attractive architecture and environmentally-sensitive site planning and which complements nearby housing and provides attractive outdoor spaces for employees and visitors.

Service, Loading and Storage Area Guidelines

Off-street loading should be regulated according to Section 5-1600 and 6-1302 of the Springfield Zoning Ordinance. The following guidelines are supplementary.

- All **storage, loading or service areas** must be located in the side or rear yards of buildings.

- No articles, goods, materials, machinery, equipment, vehicles, plants, trash, animals or similar items should be stored or kept in the **open or exposed to view** from adjacent properties, parking areas, public streets or pedestrian walkways.

- **Loading and servicing areas** should be designed so that the entire loading or servicing operations are conducted within the confines of the building site. In addition, these areas must be integrated into the building architecture. Loading doors should be recessed from the building face to minimize their visual prominence. No loading areas should be visible from public streets or building entries.

- **Screening walls and fences** should match the building architecture. .

Fencing and Walls

- All **loading and storage areas** should be screened from public streets and non-industrial land uses by using walls, fences and/or landscaping.

- Screening should be aesthetically pleasing and **complementary to the building** and its surroundings.

- Objects such as storage tanks, processing equipment, cooling towers, communication towers, vents, vehicles, or any **other structures or equipment** should be compatible with the building architecture or screened from adjacent properties, parking areas, public streets and pedestrian walkways by using fences or walls.

- **Fences or walls** should be of height at least equal to that of the materials or equipment being stored.

- **Materials and colors** for fences and walls should be compatible with the building architecture.

- **Chain link fencing** is not permitted in areas visible from non-industrial properties, parking areas, public streets and pedestrian walkways.

- A fence of heavy wood, brick or masonry columns should be installed **where a non-residential development abuts a residential area.** Landscaping should be provided on the residential side of the fence.

- **Long runs of fencing parallel to public streets** are discouraged. Where long runs cannot be avoided, the horizontal alignment of the fences should be varied to create visual variety and to provide planting "pockets" between the fence and the street.

Utilities

- All **permanent utilities** should be underground unless otherwise approved.

- Utility appurtenances, utility meters, irrigation system, backflow preventers, transformers, etc., should not be visible from adjacent properties, parking areas, public streets and pedestrian walkways. Transformers should be grouped with utility meters whenever possible.

Lighting

Lighting should be regulated according to Section 6-1400 of the Springfield Zoning Ordinance. The following guidelines are supplementary.

- **Lighting should be restrained**, limited in extent, and respectful of each sites visual environment.

- **Durable and vandal resistant fixtures** should be used.

- **Lamps** should be efficient, long lived, readily available and easily replaced.

- **Light levels** should be uniform along streets and primary pedestrian paths.

- Lights should not be placed to cause glare or excessive **light spillage onto neighboring sites.**

- **Security lighting fixtures** should not project above the roof-line of the building and should be shielded. The shields should be painted to match the surface to which they are attached. Security lighting fixtures should not be substituted for parking lot or walkway lighting fixtures, and should be restricted to lighting only loading and storage locations, or other similar service areas.

- Exterior **wall-mounted floodlights** are expressly prohibited, except for security lighting called for in areas called out above.

- **Exterior lighting fixtures** are to be as follows:

    -- Parking lot driveway fixtures: cut-off type, metal halide, rectilinear style, aluminum extrusion luminaries, thirty-foot mounting height. Single or double luminary configuration on square or round pole. Luminary and pole should match street light finish or be compatible with the building materials.

    -- Pedestrian area and walk lights: at applicant's option.

- It is recommended that **accent illumination** be provided at such key locations as building entries, driveway entries, and project signage.

Signs

Signs should be controlled according to Section 5-1400, Signs, and Section 5-1410, James River Freeway Scenic Corridor Zoning District, of the Springfield Zoning Ordinance.

Mixed- and Multiple-Use Districts

Whenever the market will support it, the City will allow and encourage investments that combine more than one type of land use on a site. Mixed-use development implies a vertical relationship (e.g., offices or housing over shops) while multiple-use development means a side-by-side positioning. Either case promotes more efficient land use, reduces auto trips somewhat and creates a more interesting urban environment.

The most promising opportunity for mixed- or multiple-use development is the Conco Quarry site. Although the mining operation is expected to continue at least another 20 or 30 years, it has the potential to be redeveloped intensively. By that time, the edge of urbanization will be well to the southeast and the quarry will be relatively conveniently located. If a new interchange is built along US 65 with an arterial road from there back to Glenstone Avenue, the quarry will have good access to the regional highway system.

Land development on that square mile could include ponds surrounded by a park, housing, offices and shops. A master plan should be prepared that coordinates the design and the public improvements so as to maximize the value of the property.

Other mixed- or multi-use development could occur near the Evans Road interchange or along the north side of US 60 east of US 65.

Quarry Re-Use: Encourage through planning, zoning and infrastructure investments intensive mixed-use development of the quarry site after mining is completed. Include water and park space.

Bridges

Much care should be taken in bridge design because bridges are the most highly visible of all structures and one of the most expensive single public works. They can be easily seen from great distances, and their massive shapes and powerful lines make strong visual statements. Located over a street or highway, a bridge can function as a gateway arch or arrival point; over a river or gorge, a bridge can be a graceful scenic complement or an intrusive eyesore. Some structures are so significant in their appearance that they are instantly recognizable and identified with their location, such as the Brooklyn Bridge in New York City or the Golden Gate Bridge in San Francisco. Many one-time visitors will drive on US 60 or US 65 on their way to or from the Ozarks, and their major impression of Springfield may be shaped by the highway bridges.

Bridge design is a careful balance of technology, science and art or architecture. A bridge design team should integrate the fundamentals of aesthetics with sound structural design and function to create a bridge form that is both visually attractive and compatible with the environment.

The fundamentals of aesthetics include visual design elements and aesthetic qualities. ***Visual design elements*** define visual perception. They include line, shape, form, color and texture. ***Aesthetic qualities*** result from employing visual design elements and are used to describe a visual composition. Aesthetic qualities include proportion, rhythm, order, harmony, balance, contrast, scale and unity.

Insist on Good Design: The City and the County should strongly advocate that all future highway or river bridges in the Southeast study area be designed with a high degree of aesthetic sensitivity. This will be especially important for the proposed fully-directional interchange of US 60 and US 65 as well as the proposed James River crossings.

Employ the Best Talent: Springfield and Greene County should involve talented architects and landscape architects in local bridge design along with structural engineers who are sensitive to the importance of aesthetic design. The City and the County should also require that the Missouri Department of Transportation do the same for all of their bridges in Greene County.

Commit Extra Funds if Necessary: An attractive bridge need not always cost more than an ordinary structure. The fundamental aesthetic quality of a bridge is determined by careful use of lines, shape, forms, colors and textures. However, if additional cost is required to achieve the needed aesthetic results, local, state and federal agencies should acknowledge the benefits of better appearance and make the necessary commitment.

Arterial Roads

Arterial roads are another major public design opportunity. Arterials create a framework for the land use pattern and provide visual clues to the structure and order of the city. Sometimes these roads can be unattractive because of the width of their pavement and when they serve major traffic generators that demand large parking lots.

Therefore, it is imperative that the City embark on a program of landscaping along roads such as Glenstone Avenue, Highway J, Battlefield Road, National Avenue or the planned East-West

Arterial. Trees should be planted in the public right-of-way – either during initial construction or as a retrofit project – as well as in the private setback. The same goes for the Major Arterials such as the James River Freeway or US 65, although those plantings would be entirely public responsibility. (Additional guidance on this subject can be found in the Community Visual Image and Character Plan of *Vision 20/20*.)

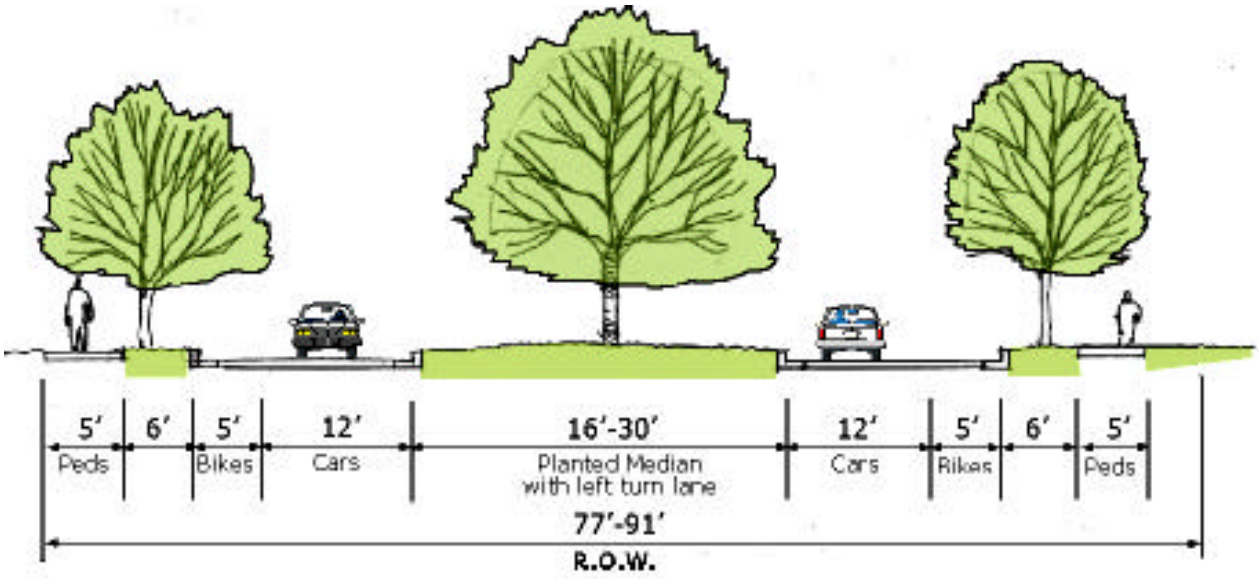
The City has an opportunity to create a highly landscaped network of roads across the community and on its perimeter, including River Bluff Road. The relatively small additional cost of such landscaping and decorative lighting will be returned to the community in tax base, economic development and quality of life.

Indigenous Materials

Designers of either private or public improvements should use native materials and plant species to the extent possible to harmonize their projects with the local environment. These include the limestone that is abundant and visible as rocky outcrops and bluff walls as well as the dominant tree species from the river alley and the uplands. The limestone might be a very appropriate material for bridge fenestration or entry monuments. The rocky outcroppings should be preserved, not leveled, as they are symbolic of the Ozarks.

River Bluffs

Along the southeastern side of the James River there are tall, wooded slopes and bluffs that give the area character and beauty. The City should amend its zoning ordinance to prohibit clearcutting the vegetation from those slopes, require building setbacks from the bluffline and prohibit driveways up the slopes.



Arterial Streets: Improve the appearance of arterial road corridors with extra landscaping and decorative lighting.

Appendix B

Evans Road Interchange Study

Table B-1:
Evans Road Traffic Volumes with Development

Scenario	Evans Rd Daily Volume	LOS*	"New Arterial" Daily Volume	LOS*
2002 No-build and existing development only	4,500	C +		
2002 No-build and Stage 1	5,000	C +		
2002 No-build and Stage 2	5,500	C +		
2002 No-build and Stage 3	10,200	E -		
2002 No-build and Stage 4	20,000	E -		
2002 No-build and Stage 5	22,000	E -		
2020 No-build and existing development only	5,700	C +		
2020 No-build and Stage 1	6,200	C +		
2020 No-build and Stage 2	6,700	D		
2020 No-build and Stage 3	11,500	E -		
2020 No-build and Stage 4	21,300	E -		
2020 No-build and Stage 5	23,200	E -		
2002 Build and existing development only	1,500	C +	6,800	C +
2002 Build and Stage 1	1,600	C +	7,300	C +
2002 Build and Stage 2	1,600	C +	7,800	C +
2002 Build and Stage 3	2,400	C +	11,700	C +
2002 Build and Stage 4	4,100	C +	19,800	C +
2002 Build and Stage 5	4,400	C +	21,400	C +
2020 Build and existing development only	2,500	C +	11,800	C +
2020 Build and Stage 1	2,600	C +	12,300	C +
2020 Build and Stage 2	2,700	C +	12,700	C +
2020 Build and Stage 3	3,600	C +	17,400	C +
2020 Build and Stage 4	5,500	C +	26,800	C +
2020 Build and Stage 5	6,000	C +	28,800	D
* + indicates that LOS and better, - indicates that LOS and worse				

Table B-2:
US 65 / Evans Road Interchange Level of Service with Signalization

Existing Geometry with Signals under different development scenarios	PM Peak Hour Intersection - LOS (delay)			
	2002 No-build	2020 No-build	2002 Build	2020 Build
Existing	A (10 sec)		D (47 sec)	F (>100 sec)
Stage 1 Development	B (11 sec)		E (58 sec)	F (>100 sec)
Stage 2 Development	B (11 sec)	B (15 sec)	E (58 sec)	F (>100 sec)
Stage 3 Development	E (61 sec)	F (89 sec)	F (>100 sec)	
Stage 4 Development	F (>100 sec)			
Stage 5 Development				

Table B-3:
US 65 / Evans Road Interchange Level of Service with Mitigation Measures

Scenario	PM Peak Hour Intersection LOS (Delay)	PM Peak Hour Southbound On-Ramp LOS	PM Peak Hour Southbound On-Ramp Delay	PM Peak Hour Northbound Off-Ramp LOS	PM Peak Hour Northbound Off-Ramp Delay
2020 Build with full development, existing geometry	F (> 100 sec)	F	> 100 sec	F	> 100 sec
2020 existing geometry with signals	F (> 100 sec)	F	> 100 sec	F	> 100 sec
2020 Build with full development, existing geometry with signals and double left	D (47 sec)	D	54.7 sec	D	36.1 sec
2020 Build with full development, partial cloverleaf	C (27 sec)	D	51.7 sec	B	17.6 sec
2020 Build with full development, single point	D (49.2 sec)	-	-	-	-

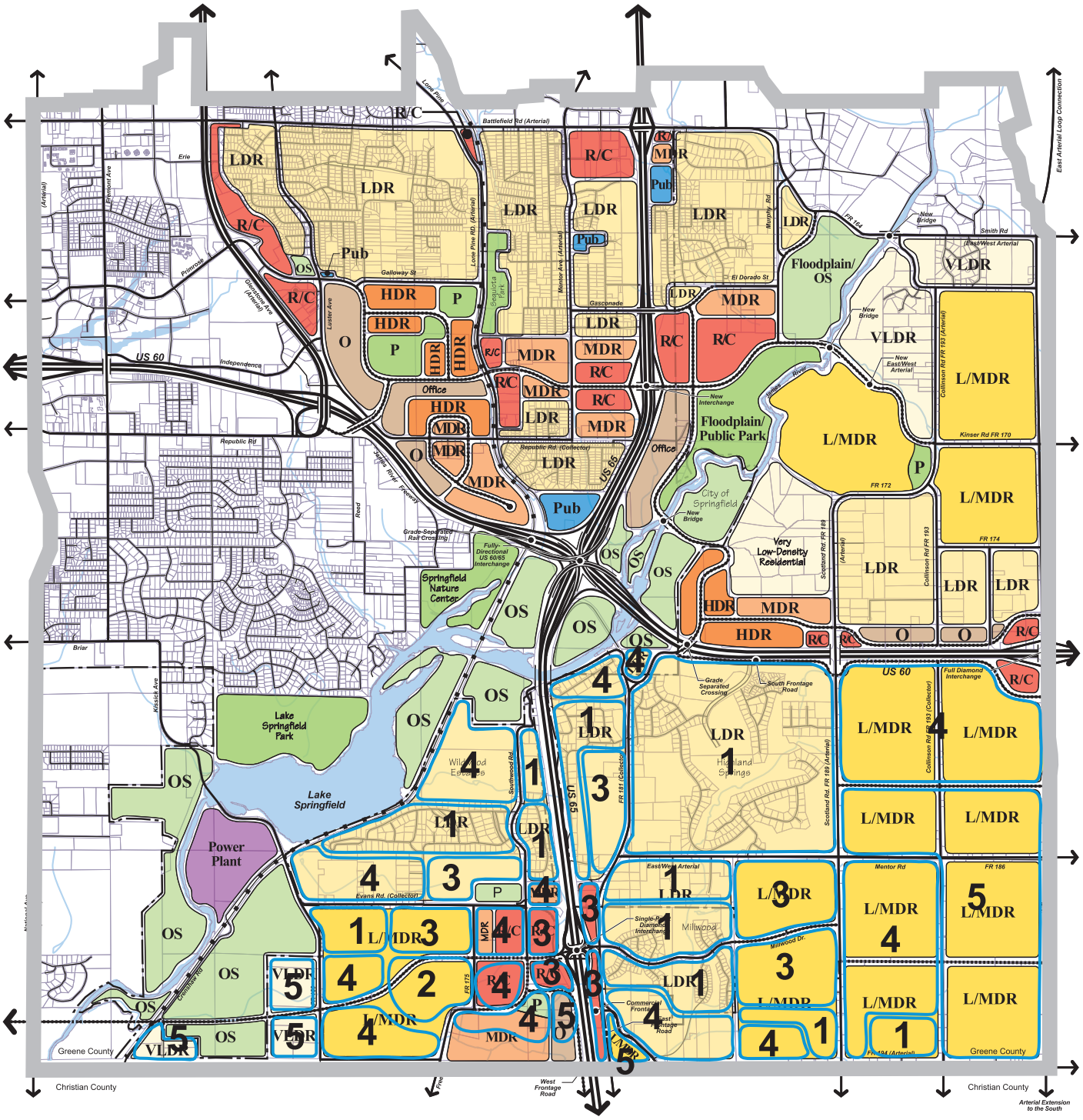
Table B-4:
US 65 / Evans Rd Interchange Design Options Cost Estimates

Option	Work Required	Number of Units	Unit Cost	Estimated Cost
A	**Signals Only with 2-lane Bridge**			
	Two Traffic Signals	2	$160,000.00	$320,000.00
	Subtotal for Alternative			***$320,000.00***
B	**Double Left Turn From Evans Road**			
	6-lane bridge 400' long (33,600 Sq. Ft.)	33600	$90.00	$3,024,000.00
	Two Traffic Signals	2	$180,000.00	$360,000.00
	Ramp Modification (1000' of 1 lane)	0.2	$750,000.00	$150,000.00
	Subtotal for Alternative			***$3,534,000.00***
C	**Partial Clover Leaf Design**			
	5-lane bridge 420' long with taper (32,760 Sq. Ft.)	32760	$90.00	$2,948,400.00
	One Traffic Signal	1	$180,000.00	$180,000.00
	2 new ramps (~3000' of 2-lane)	0.6	$1,500,000.00	$900,000.00
	Subtotal for Alternative			***$4,028,400.00***
D	**Single Point Diamond**			
	Single Point Diamond Bridge	1	$5,500,000.00	$5,500,000.00
	One Complex Traffic Signal	1	$220,000.00	$220,000.00
	4 new ramps (~6000' of 2-lane)	1.2	$1,500,000.00	$1,800,000.00
	Subtotal for Alternative			***$7,520,000.00***

Forecast Build-Out Development by Stage and Zone

	Dwelling Units *					1000s of SF of Retail Building					
TAZ	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	
1				160							
2	20										
3	70										
4	30										
5				80							
6			60								
7				30							
8	80										
9			70								
10				30							
11									62		
12								62			
13					10						
14				40							
15		30									
16		40									
17									130		
18								62			
19					10						
20				80							
21				160							
22										200	Office
23				10							
24											
25	200										
26				180							
27				170							
28	60										
29			30								
30					100						
31					100						
32	20										
33			110								
34				180							
35					180						
36								40			
37	60										
38			120								
39				180							
40					180						
41								35			
42				30							
43					20						
44	20										
45				30							
46	10										
47	70										
Totals	640	70	390	1360	600			199	192	200	

***** Residential estimate was reduced by 25% to account for roads and existing large lots.



VLDR	Very Low-Density Residential < 1 DU/Ac.
LDR	Low-Density Residential 1-4 DU/Ac.
L/MDR	Low/Mid-Density Residential 1-8 DU/Ac.
MDR	Mid-Density Residential 4-10 DU/Ac.
HDR	High-Density Residential > 10 DU/Ac.
O	Office
R/C	Retail or Service Business Including Offices
P	Parks
OS	Open Space
Pub	Public, School or Cemetery
Power Plant	Power Plant

0 1/4 1/2 3/4 1 Mile

North

10 AC
40 AC

CITY of SPRINGFIELD

Southeast Springfield Development Study

Figure B-1

Development Stages near Evans Road Interchange

URS

MEMORANDUM

Thresher Square
700 Third Street South
Minneapolis, MN 55415
Phone: (612) 370-0700
Fax: (612) 370-1378

To: Fred May, Director of Planning
City of Springfield

From: Bill Weber, Dan Meyers, Kate Sanderson

Date: March 19, 2002

Subject: Interchange of Evans Road and US 65

This memo investigates facility performance of the US 65 interchange with Evans Road, and Evans Road, west of US 65, under various scenarios associated with the staging of the proposed Southeast Springfield development.

Description and Methodology

The proposed southeast Springfield development incorporates new housing, retail and offices as shown in **Figure 1**. There are five sequenced stages to this development, as detailed in **Figure 2**.

Table 1 summarizes the development units and staging, which are based on density assumptions shown in **Table 2**. Institute of Engineers trip generation rates (**Table 3**) were used to calculate the associated trip generation forecasts (**Table 4**).

These trips were then distributed based on the Springfield TRANPLAN model that was previously developed and the Institute of Engineers directional distribution (exiting and entering percentages) for land use. Two models that have been developed in the past for Springfield are for horizon year 2020, reflecting both “no-build” and “build” conditions.

Build conditions that directly affect the southeast Springfield study area include the US 65 capacity expansion and the new arterial connecting US 65 and National Blvd. The background volumes and directional splits from these two models are different, and therefore the new development volumes were loaded onto four different base networks to incorporate shifts in splits and volumes when new infrastructure occurs.

Figure 3 shows existing PM peak period counts, and **Figures 4** to **7** reflect no-build 2002 and 2020, build 2002 and 2020.

- The first of these, no-build 2002, takes the existing volumes, and adds the new volumes distributed according to the Springfield TRANPLAN no-build model.
- No-build 2020 uses the Springfield TRANPLAN model volumes as a base, but uses the new development volumes to generate trips rather than those used in the model for the applicable Traffic Analysis Zones (TAZ).
- The build model is treated in a similar way for 2002 and 2020 but using the appropriate TRANPLAN build model for Springfield.

These scenarios are summarized in two tables, reflecting the two areas of interest, Evans Rd (**Table 5**) and the US 65/Evans Rd interchange (**Table 6**).

Analysis of both these facilities uses the qualitative measure of level of service to gauge operating conditions. Evans Rd analysis is based on daily traffic volumes. US 65/Evans Rd interchange analysis was based on PM peak hour conditions, because the PM peak period count contained the most recent information and provides the detailed turning movements necessary for level of service analysis for intersections. Further analysis will also need to be carried out to estimate AM peak conditions, based either on assumptions or counts.

The peak period geometry, volumes, truck percentages, and signal timings were input to Synchro to determine LOS and delay. LOS and delay, as defined by Highway Capacity Manual (HCM) were used as the measures of effectiveness (MOE).

Conclusions

Table 5 summarizes the LOS for Evans Road under the various development scenarios. With no infrastructure improvements (no-build) Evans Rd will perform at LOS D or better until the completion of Stage 3 development for both the current and horizon years when it degrades to E. Significant volumes are generated in stages 4 and 5, and Evans Rd would degrade into LOS (F and worse) breakdown conditions at this point.

For the build scenario (meaning improvements to US 65 and a new arterial between US 65 and National Blvd) Evans Rd will perform at LOS C or better for all stages of development. The ‘new arterial’ connection will perform at LOS D or better for all stages of development, and will be at LOS C or better until completion of stage 5 in the horizon year.

US 65 / Evans Rd interchange was studied only for the PM peak hour to give an indication of delay currently and under development staging.

- Currently the SB ramp is LOS F, and would be over-capacity and enduring breakdown conditions with 2020 build and full development (**Table 7).**

Signalization of the interchange will improve operation to acceptable LOS under existing conditions. This would be a short- to mid-term solution, with LOS degrading further under various development scenarios, as shown in **Table 6**.

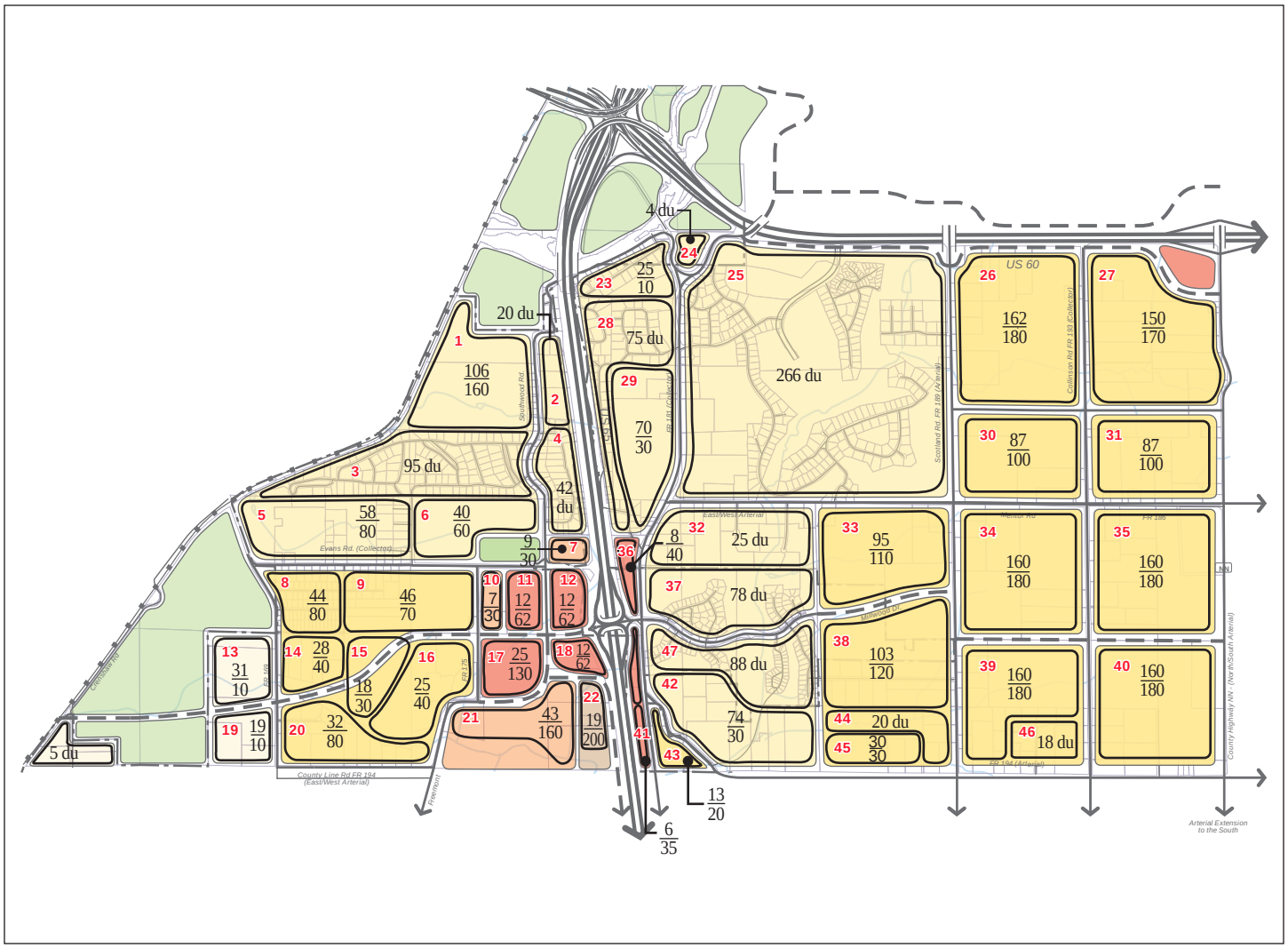
- At 2002 volumes (and no-build infrastructure) the interchange would operate at LOS B until stage 3 development was complete, when it would operate at LOS E, degrading to F with further development.
- In 2020 (no-build infrastructure) the interchange would operate at LOS B until completion of stage 3 development when it would be at LOS F.
- In 2002, with the infrastructure 'build' scenario, the interchange would be at LOS E with stage 1 and 2 development, and F with stage 3.
- In 2020, with the infrastructure 'build' scenario, the interchange would be at LOS F under existing development.

Several mitigation measures were analyzed—including signalization of the current diamond, additional left turn lanes, a partial cloverleaf and the construction of a single point interchange, this is summarized in **Table 7**.

- In 2020, with full 'build' infrastructure and development build-out, the partial cloverleaf is estimated to be LOS C, and the double lefts and single point will be LOS D.

Table 8 summarizes rough cost estimates for these design options. As a short- to medium-term solution, signals could be installed for about $320,000. In the longer term, reconstruction of the interchange to widen the Evans Rd overpass and include double left-turn lanes northbound would be about $3,534,000. Reconstruction of overpass with partial cloverleaf would be about $4,028,400. A single point diamond would cost about $7,520,000.

If you have any questions concerning this technical memorandum, please contact Bill Weber at 612-373-6343, Dan Meyers at 612-373-6446 or Kate Sanderson at 612-373-6820.



Acres

Dwelling Units or
1000'S of Square Feet
of Commercial Space

1 Traffic Assignment Zone for this study

0 1/4 1/2 3/4 1 Mile

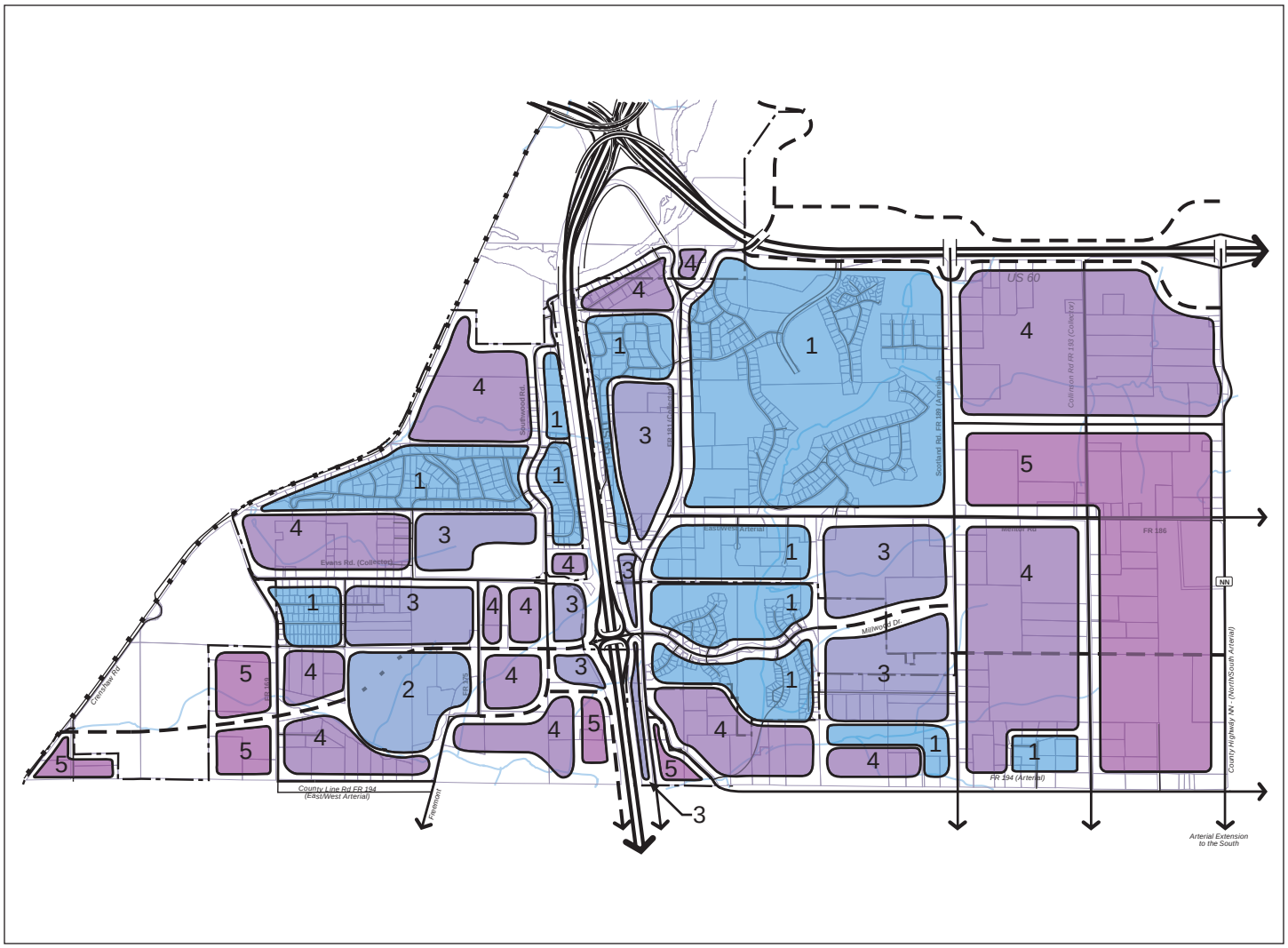
North

10 AC
40 AC

CITY of SPRINGFIELD

Southeast Springfield Development Study

Figure 1
Buildout Density Assumptions



5 - Development Stage

0 1/4 1/2 3/4 1 Mile

North

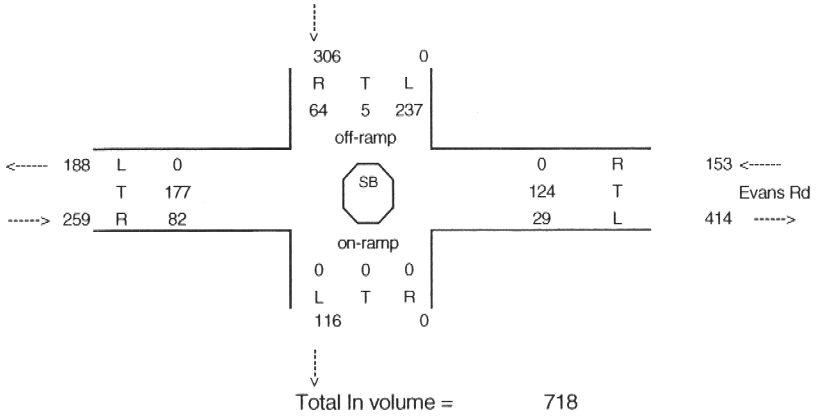
10 AC
40 AC

CITY of SPRINGFIELD

Southeast Springfield Development Study

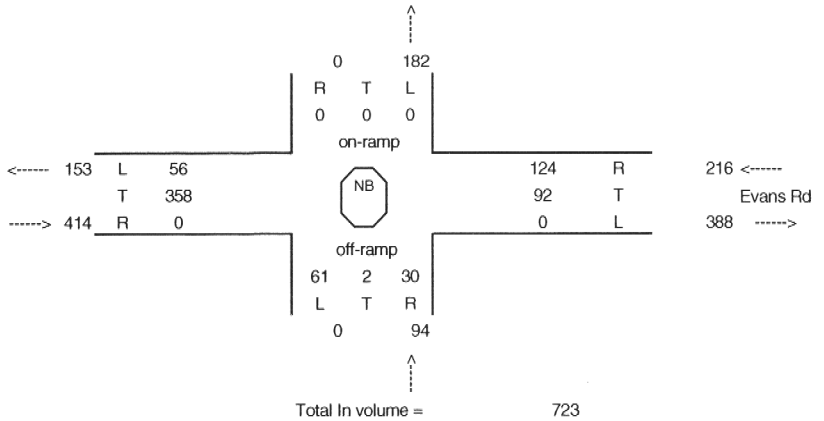
Figure2
Development Stages

Year 2002 - PM Peak Period Counts (3/7/02)



SB

SB Off-ramp			Evans Rd WB			Evans Rd EB				
R	**T**	**L**	**R**	**T**	**L**	**R**	**T**	**L**	**TOTAL**	RANK
11	0	27	0	20	9	18	42	0	**127**	8
10	0	39	0	41	9	18	47	0	**164**	**4**
11	*0*	*53*	*0*	*25*	*8*	*30*	*44*	*0*	***171***	**3**
13	*1*	*43*	*0*	*27*	*8*	*20*	*46*	*0*	***158***	5
24	*0*	*53*	*0*	*37*	*5*	*13*	*46*	*0*	***178***	**2**
16	*4*	*88*	*0*	*35*	*8*	*19*	*41*	*0*	***211***	**1**
11	0	54	0	23	6	24	28	0	**146**	7
21	4	52	0	26	11	13	31	0	**158**	5
64	5	237	0	124	29	82	177	0	718	



Note: These counts have been balanced to reflect higher input volumes from adjacent count.

NB

Evans Rd WB			NB Off-ramp			Evans Rd EB				
R	**T**	**L**	**R**	**T**	**L**	**R**	**T**	**L**	**TOTAL**	RANK
28	25	0	8	0	7	0	45	22	**135**	**4**
20	26	0	7	1	10	0	54	12	**130**	6
28	*19*	*0*	*5*	*2*	*15*	*0*	*54*	*11*	***134***	5
25	*16*	*0*	*10*	*0*	*11*	*0*	*67*	*8*	***137***	**3**
27	*20*	*0*	*6*	*0*	*15*	*0*	*61*	*10*	***139***	**2**
31	*27*	*0*	*6*	*0*	*14*	*0*	*81*	*12*	***171***	**1**

Figure 3: Existing PM Peak Period Counts

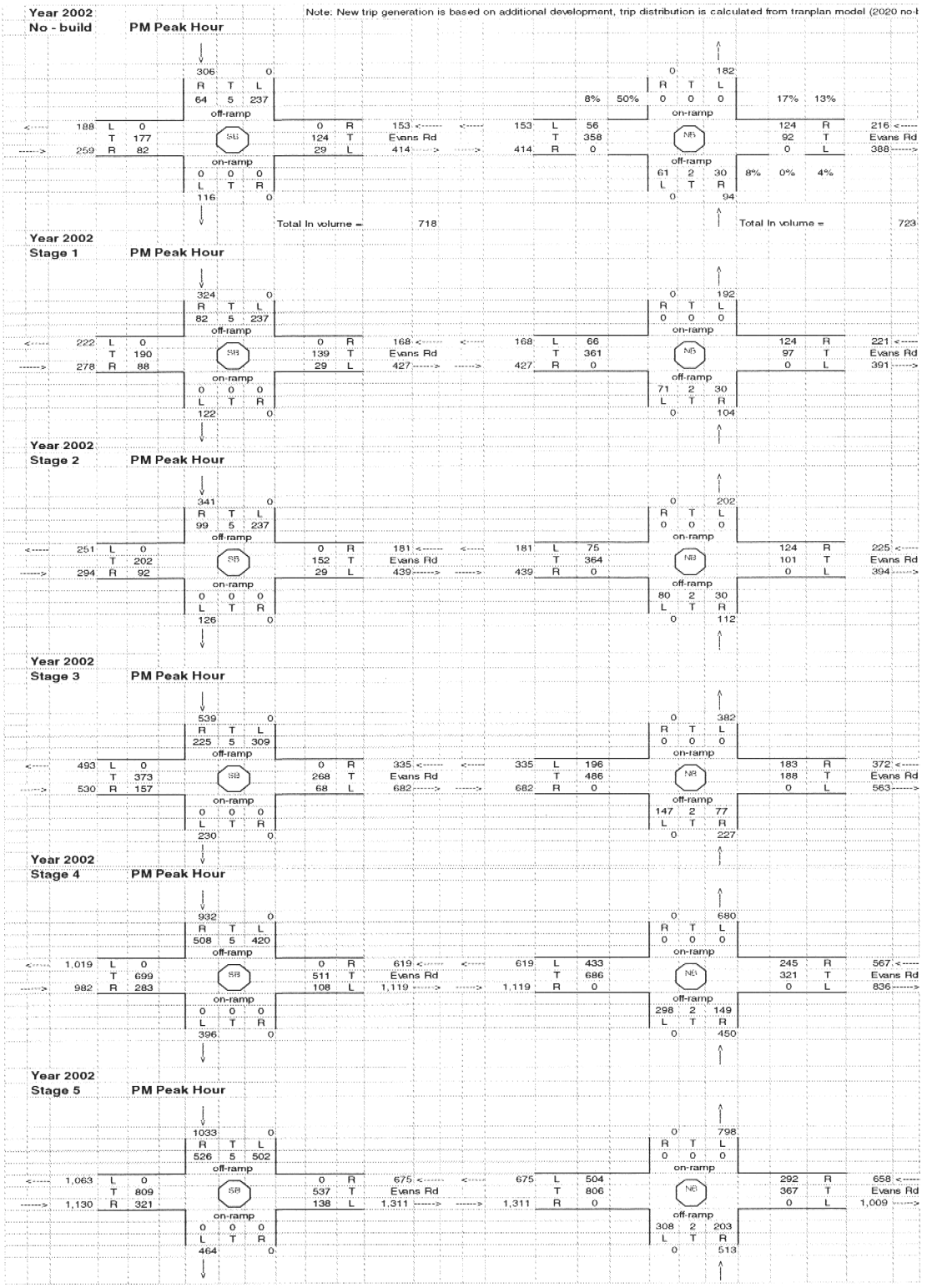


Figure 4: 2002 No-build with development staging

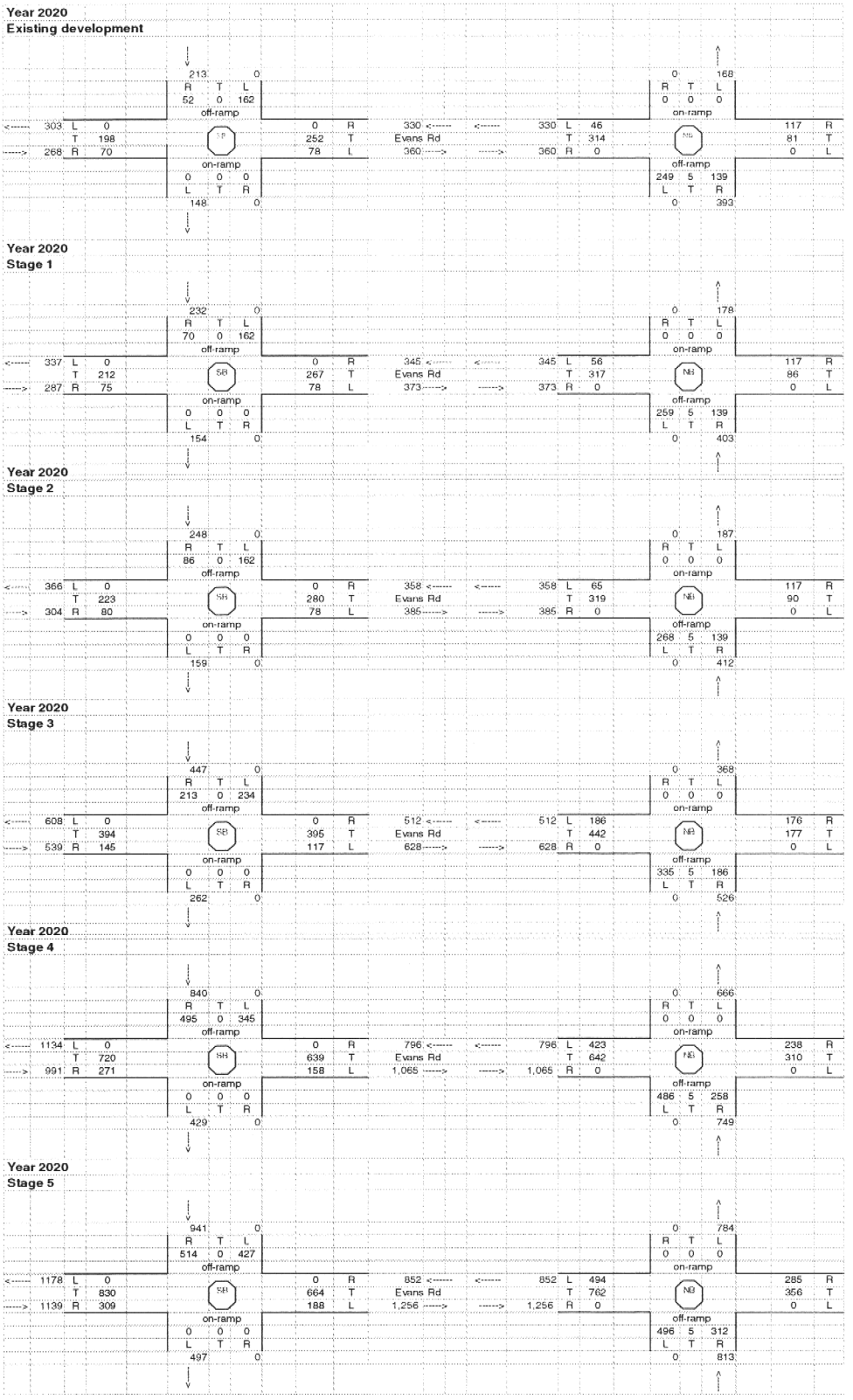


Figure 5: 2020 No-build with development staging

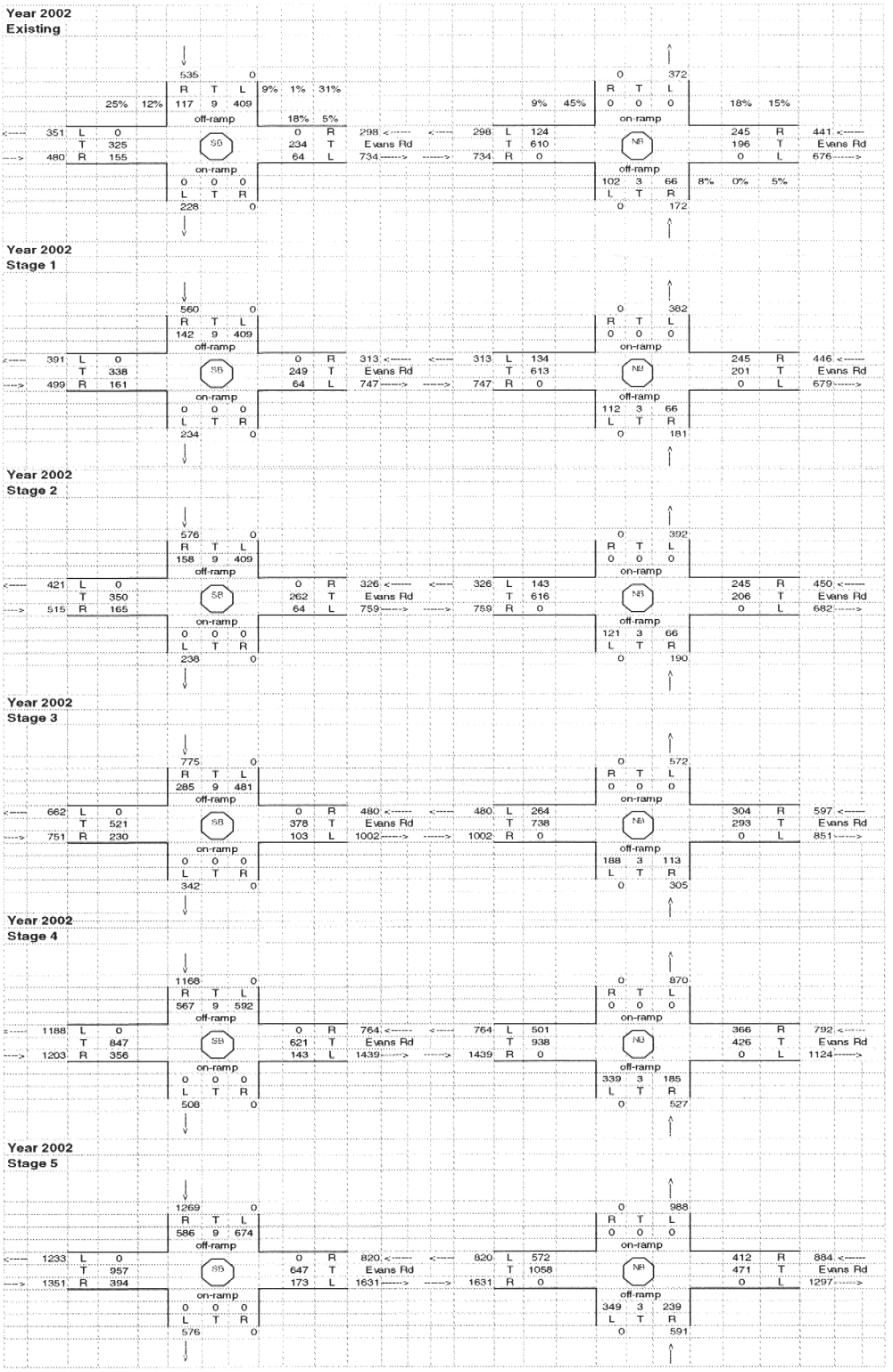


Figure 6: 2002 Build with development staging

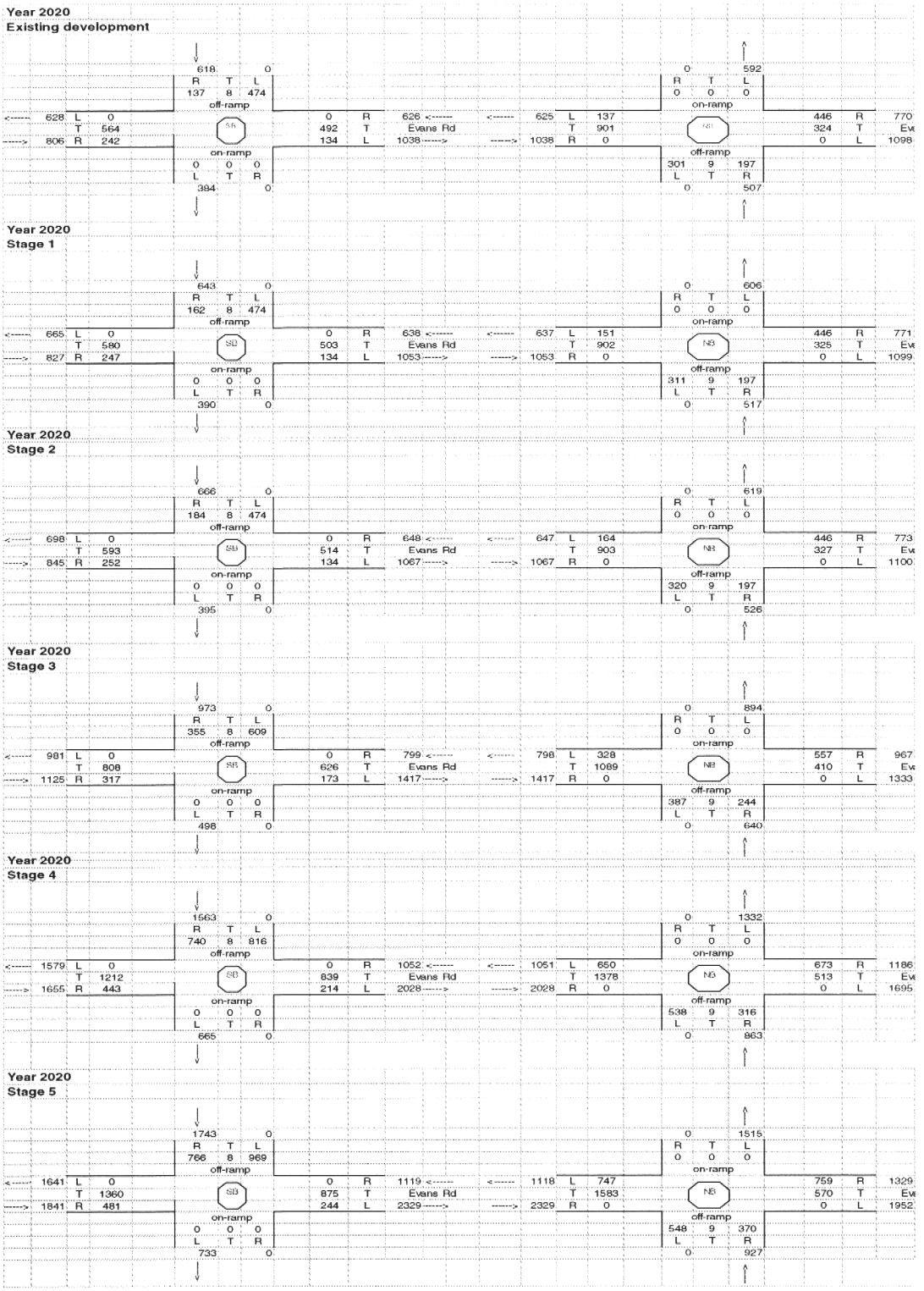


Figure 7: 2020 Build with development staging

	Dwelling Units						1000s of SF of Retail Building					
TAZ	Existing	1	2	3	4	5	1	2	3	4	5	
1					160							
2	20											
3	95											
4	42											
5					80							
6				60								
7					30							
8		80										
9				70								
10					30							
11										62		
12									62			
13						10						
14					40							
15			30									
16			40									
17										130		
18									62			
19						10						
20					80							
21					160							
22											200	Office
23					10							
24	4											
25	266											
26					180							
27					170							
28	75											
29				30								
30						100						
31						100						
32	25											
33				110								
34					180							
35						180						
36									40			
37	78											
38				120								
39					180							
40						180						
41									35			
42					30							
43						20						
44	20											
45					30							
46	18											
47	98											
Totals		80	70	390	1360	600	0	0	199	192	200	

Table 1: Development Units and Staging

District	DU / Gross Acre	FAR
Very Low Density Residential	0.5	
Low Density Residential		
East of US 65	1.5	
West of US 65	2	
Mid Density Residential	5	
Retail Businesses		0.15
Office Buildings		0.25

Source: URS Corp (BW-3/15/02)

Table 2: Density Assumptions

Land Use	Daily Trip Rate	PM Peak Directional Distribution
Shopping Center	42.92	48 % Entering / 52 % Exiting
Office	11.01	17 % Entering / 83 % Exiting
Single Family Housing	9.57	64 % Entering / 36 % Exiting

Source: Institute of Transportation Engineers, Trip Generation, 6th Edn

Table 3: Trip Rates

		Daily Trip Generation				
TAZ	**Existing**	**1**	**2**	**3**	**4**	**5**
1					1,540	
2	200					
3	910					
4	410					
5					770	
6				580		
7					290	
8		770				
9				670		
10					290	
11					2,670	
12				2,670		
13						100
14					390	
15			290			
16			390			
17					5,580	
18				2,670		
19						100
20					770	
21					1,540	
22						2,210
23					100	
24	40					
25	2,550					
26					1,730	
27					1,630	
28	720					
29				290		
30						960
31						960
32	240					
33				1,060		
34					1,730	
35						1,730
36				1,720		
37	750					
38				1,150		
39					1,730	
40						1,730
41				1,510		
42					290	
43						200
44	200					
45					290	
46	180					
47	940					
Totals		770	680	12,320	21,340	7,990

Table 4: Trip Generation by staging (ITE Trip Gen)

Scenario	Evans Rd Daily Volume	LOS*	"New Arterial" Daily Volume	LOS*
2002 No-build and existing development only	4,500	C +		
2002 No-build and Stage 1	5,000	C +		
2002 No-build and Stage 2	5,500	C +		
2002 No-build and Stage 3	10,200	E -		
2002 No-build and Stage 4	20,000	E -		
2002 No-build and Stage 5	22,000	E -		
2020 No-build and existing development only	5,700	C +		
2020 No-build and Stage 1	6,200	C +		
2020 No-build and Stage 2	6,700	D		
2020 No-build and Stage 3	11,500	E -		
2020 No-build and Stage 4	21,300	E -		
2020 No-build and Stage 5	23,200	E -		
2002 Build and existing development only	1,500	C +	6,800	C +
2002 Build and Stage 1	1,600	C +	7,300	C +
2002 Build and Stage 2	1,600	C +	7,800	C +
2002 Build and Stage 3	2,400	C +	11,700	C +
2002 Build and Stage 4	4,100	C +	19,800	C +
2002 Build and Stage 5	4,400	C +	21,400	C +
2020 Build and existing development only	2,500	C +	11,800	C +
2020 Build and Stage 1	2,600	C +	12,300	C +
2020 Build and Stage 2	2,700	C +	12,700	C +
2020 Build and Stage 3	3,600	C +	17,400	C +
2020 Build and Stage 4	5,500	C +	26,800	C +
2020 Build and Stage 5	6,000	C +	28,800	D

* + indicates that LOS and better, - indicates that LOS and worse

Table 5: Evans Rd Volumes with development

Existing Geometry with Signals under different development scenarios	PM Peak Hour Intersection - LOS (delay) 2002 No-build	2020 No-build	2002 Build	2020 Build
Existing	A (10 sec)		D (47 sec)	F (>100 sec)
Stage 1 Development	B (11 sec)		E (58 sec)	F (>100 sec)
Stage 2 Development	B (11 sec)	B (15 sec)	E (58 sec)	F (>100 sec)
Stage 3 Development	E (61 sec)	F (89 sec)	F (>100 sec)	
Stage 4 Development	F (>100 sec)			
Stage 5 Development				

Table 6: US 65 / Evans Rd interchange analysis with signalization

Scenario	PM Peak Hour Intersection - LOS (delay)	PM Peak Hour SB Ramp LOS	PM Peak Hour SB Ramp Delay	PM Peak Hour NB Ramp LOS	PM Peak Hour NB Ramp Delay	Comment
Existing geometry (2002 volumes)	-	F	37.2 sec	C	18.9 sec	Infrastructure no-build
2020 Build with full development, existing geometry	F (> 100 sec)	F	> 100 sec	F	> 100 sec	Infrastructure build and full development
2020 existing geometry with signals	F (> 100 sec)	F	> 100 sec	F	> 100 sec	Infrastructure build and full development
2020 Build with full development, existing geometry with signals and double left	D (47 sec)	D	54.7 sec	D	36.1 sec	Infrastructure build and full development
2020 Build with full development, partial cloverleaf	C (27 sec)	D	51.7 sec	B	17.6 sec	Infrastructure build and full development
2020 Build with full development, single point	D (49.2 sec)	-	-	-	-	Infrastructure build and full development

Table 7: US 65 / Evans Rd interchange analysis with mitigation

Option	Work Required	Number of Units	Unit Cost	Estimated Cost
A	**Signals Only with 2-lane Bridge**			
	Two Traffic Signals	2	$160,000.00	$320,000.00
	Subtotal for Alternative			***$320,000.00***
B	**Double Left Turn From Evans Road**			
	6-lane bridge 400' long (33,600 Sq. Ft.)	33600	$90.00	$3,024,000.00
	Two Traffic Signals	2	$180,000.00	$360,000.00
	Ramp Modification (1000' of 1 lane)	0.2	$750,000.00	$150,000.00
	Subtotal for Alternative			***$3,534,000.00***
C	**Partial Clover Leaf Design**			
	5-lane bridge 420' long with taper (32,760 Sq. Ft.)	32760	$90.00	$2,948,400.00
	One Traffic Signal	1	$180,000.00	$180,000.00
	2 new ramps (~3000' of 2-lane)	0.6	$1,500,000.00	$900,000.00
	Subtotal for Alternative			***$4,028,400.00***
D	**Single Point Diamond**			
	Single Point Diamond Bridge	1	$5,500,000.00	$5,500,000.00
	One Complex Traffic Signal	1	$220,000.00	$220,000.00
	4 new ramps (~6000' of 2-lane)	1.2	$1,500,000.00	$1,800,000.00
	Subtotal for Alternative			***$7,520,000.00***

Assumptions: Planning level analysis, 2002 Construction Only Costs (No estimate for ROW)

Table 8: US 65 / Evans Rd Interchange Design Options Cost Estimates